

Railway Engineering and Maintenance

DECEMBER, 1942

Greetings



MERRY CHRISTMAS AND/
A PROSPEROUS NEW YEAR

THE NATIONAL LOCK WASHER COMPANY



Season's Greetings



EATON MANUFACTURING COMPANY
RELIANCE SPRING WASHER DIVISION
MASSILLON, OHIO

Sales Offices: New York, Cleveland, Detroit, Chicago, St. Louis, San Francisco, Montreal

Season's Greetings

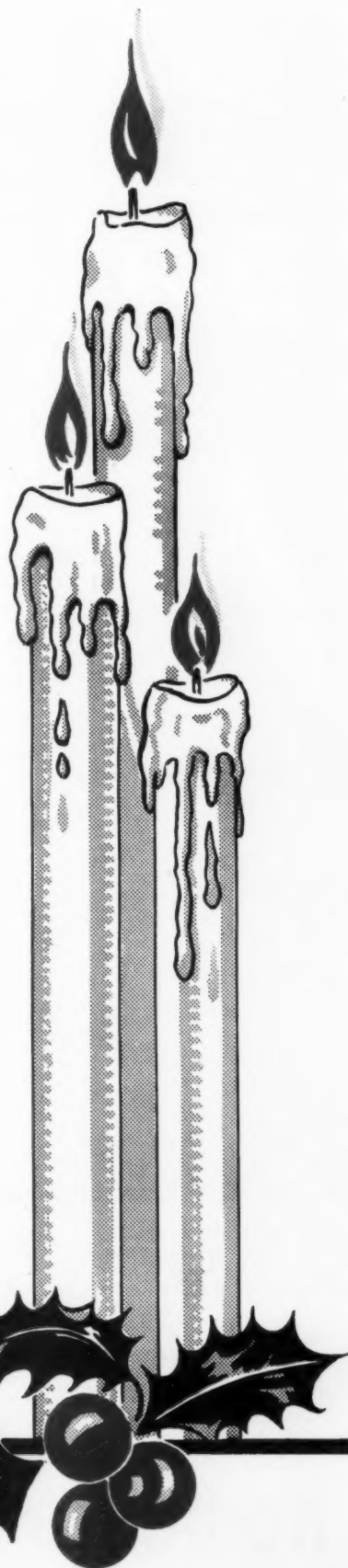
In these times it is gratifying to find that there is still an appreciation of friendships and real values. We are deeply grateful for the fact that so many of our friends, who started using Woodings-Verona Products several generations ago, are holding our Products and Organization in steadily increasing Esteem.



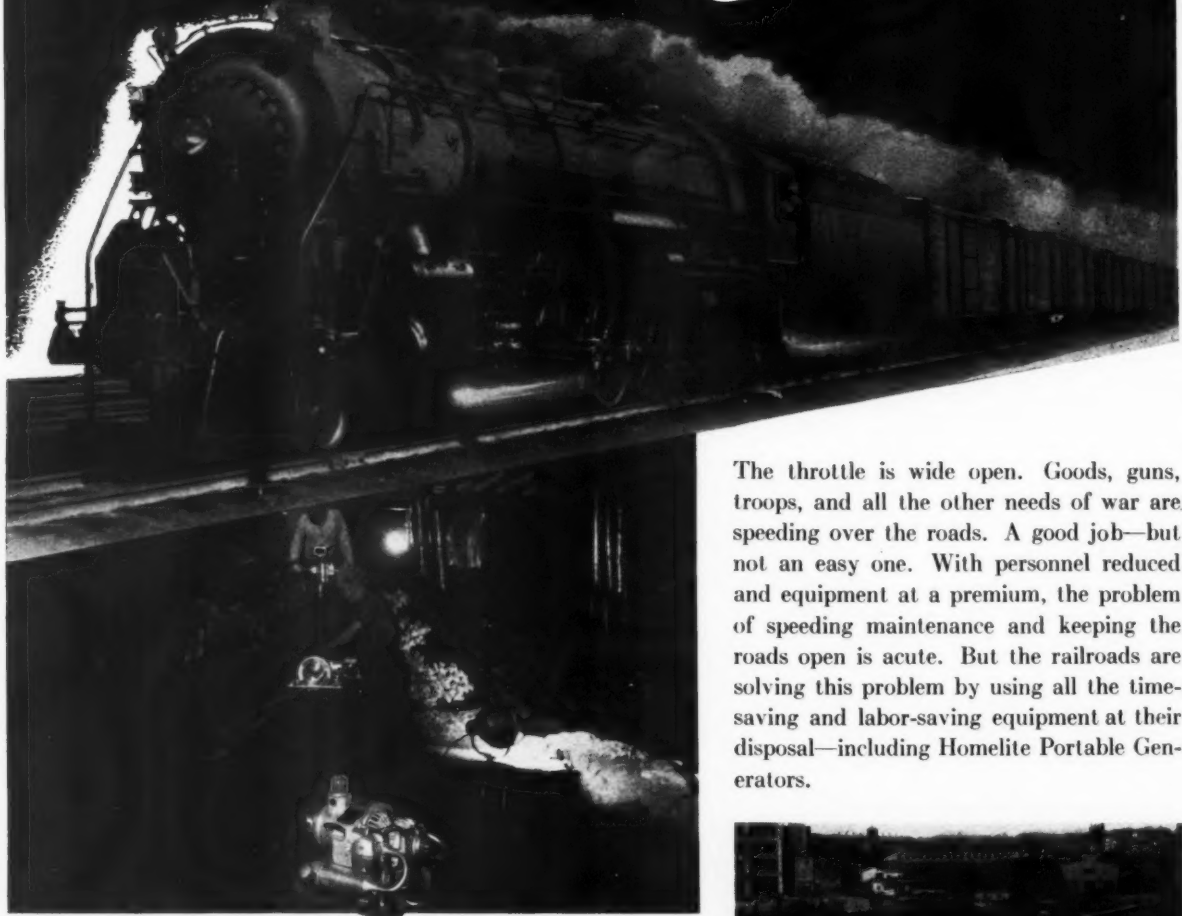
WOODINGS-VERONA TOOL WORKS
WOODINGS FORGE and TOOL COMPANY



VERONA, PA.



There's No Stopping Us Now



If a bridge is out, repairs must be made right through the night. It's much easier with a Homelite Generator. This portable gasoline-engine-driven unit, easily set up for action by one man, produces enough power to floodlight the job brilliantly and to operate electric hand tools as well.



THERE'S NO STOPPING US EITHER

Here, at the Homelite Plant, the throttle is also wide open. As much as we can produce, twenty-four hours every day, is going to the armed forces. And there's no stopping us—not until the war is won.

The throttle is wide open. Goods, guns, troops, and all the other needs of war are speeding over the roads. A good job—but not an easy one. With personnel reduced and equipment at a premium, the problem of speeding maintenance and keeping the roads open is acute. But the railroads are solving this problem by using all the time-saving and labor-saving equipment at their disposal—including Homelite Portable Generators.



One man, operating electric tools with a Homelite Portable Generator, gets more work done than several men working with slow hand tools. And one man can handle a Homelite easily.

Homelite Corporation

PORT CHESTER, N. Y.

Point attachment showing locking rod clamped to switch point.

a **LOCKED** SWITCH is a **SAFE** SWITCH



Style 3911 for high stands — normally padlocked as shown but hand lever may also be padlocked or simple interlocking means provided.

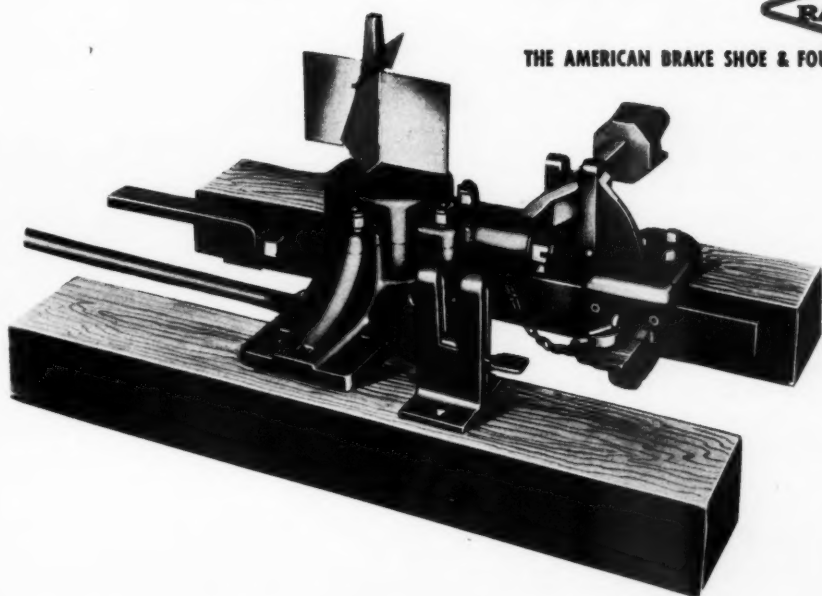
The Racor Switch Point Lock protects the switch, even if the stand is knocked down. Its mechanism is entirely separate from the stand and located below the top of the tie.

- ① Easy installation and maintenance.
- ② Simple and accurate adjustment.
- ③ Convenient treadle release, which does not delay opening of switch.
- ④ Direct clamping of locking rod to switch points.
- ⑤ Impossible to insert padlock unless switch is properly closed.

RAMAPO AJAX DIVISION



THE AMERICAN BRAKE SHOE & FOUNDRY CO. • 230 Park Ave., New York



Style 3912 for Ground Throw stands. Note that one padlock provides positive locking and prevents raising of hand lever.

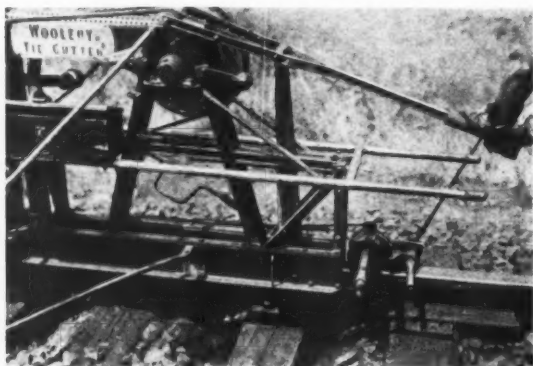
In 1943

Open A 2nd Front

Against Waste of Time and Labor

WOOLERY TIE CUTTERS

Push Tie Renewals Through Ahead of Schedules



The Railroads are now going at top speed day and night to keep the promise and Woolery Tie Cutters are contributing to the final Victory by enabling many railroads to reduce tie renewal schedules that are already curtailed by war traffic.

Watch Woolery Tie Cutters work . . . and you'll realize that they are the machines you will need in 1943 . . . and after the war. A skeleton gang, equipped with Woolery Tie Cutters can efficiently carry on work ordinarily handled by a larger gang, saving valuable manpower and man hours.

The Woolery Tie Cutter saws the tie quickly into three easily-removable pieces, leaves the tieded practically undisturbed for the new tie, eliminates trenching and reduces tamping to a minimum.

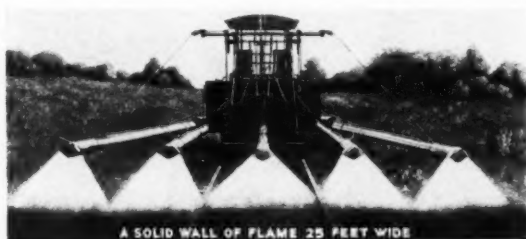
The Woolery Tie Cutter works equally efficiently in Stone, Gravel, or other Types of Ballast.

WOOLERY WEED BURNERS

Save Time Where It Counts—Destroy Weeds Quickly

Woolery Weed Burners are helping more than sixty roads to remove weeds quickly, efficiently.

For the peak traffic of 1943 tracks will have to be kept in first-class shape . . . free of weeds and their harmful effects. Woolery Weed Burners will aid you in eradicating weeds speedily, thoroughly and economically. They are available in 5-burner, 3-burner, 2-burner and 1-burner models.



Above: 5-burner Giant Octopus Model; 3- and 2-burner Models also available.

Woolery Junior Weed Burner



Protect Yourself NOW by Putting These Units in Your 1943 Budget!

WOOLERY MACHINE CO.

MINNEAPOLIS
MINNESOTA

PLAN NOW FOR

1943's

VITAL

TRACK MAINTENANCE PROGRAM

*Make full use of
DEPENDABLE, EFFICIENT
DUFF-NORTON JACKS*



No. 117

The railroad man's favorite everywhere.

1943's expanded track maintenance and service program will mean harder, more gruelling work for all of your men and equipment. It means you've got to make the most of every man, machine and tool you have.

Your dependable, efficient Duff-Norton Jacks will help you in this speed-up of your track work. These sturdy "mechanical muscles" are built to stand up under the toughest kind of day-in and day-out service. Make the most of them in '43!

Catalog 201 fully describes the entire Duff-Norton line — gives you helpful data on these Jacks — the railroad man's favorite. Have you a copy in your files?

No. 304

This Side-Lift Jack is a handy tool.



TIE PULLER

Exclusive Duff-Norton Jack saves time and labor in tie-replacement.



No. 517

Surface and Lining Jack. Easily handles the heaviest rails.



"THE HOUSE THAT JACKS BUILT"

**THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PA.**

Canadian Plant:
COATICOOK, QUEBEC

Representatives in
Principal Cities



Nothing to hold up this "crack" Burlington Zephyr as it whizzes by . . . on time! Grading is carried on "off-the-track" by the 2-cycle Diesel tractor and 2-wheel scraper.



For really getting around in tight places . . . digging, carrying, loading, spreading or dumping material . . . you can't beat this Allis-Chalmers tractor-shovel. Small enough to work along side your tracks! Big enough for any grading job!

No maintenance crew is complete without this 2-cycle Diesel tractor and bulldozer—handles the heaviest type of work. Easily uproots trees, digs out big boulders and pushes them aside, widens ditches, slopes, builds up shoulders . . . a variety of uses!

&

HURRY. . . get the men and materials through! You probably hear that often now. It's speed and more speed — never was time so important!

Helping many a railroad get their trains through on time, regardless of heavy wartime schedules, are these "off-track" grading and maintenance units. Each outfit does its work *clear of the tracks* . . . quickly, safely, at less cost. No delays, no traffic tie-ups, no danger of accidents, either. You keep the way open for wartime demands . . . at the same time give hard used track beds the regular care and attention they require.

It will pay you many times over if you can obtain the necessary priority for any of these tools. If you have to wait . . . include them in your "be sure to get" list of time and cost-saving machinery.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE • U. S. A.





EVERY TOOL STEEL HAS AN ALTERNATE

..it pays to know them

AS war production rises rapidly toward its peak, the problem of *materials* becomes more and more insistent.

High Speed Steels furnish one of the best examples, because these special steels depend for their properties on some of the most critical alloying elements in the list. Continuity of supply of High Speed Steel is absolutely essential to continuity of production; yet, under the exigencies of equable distribution, you may encounter a temporary short-

ness of supply in your first-choice cutting steels at any given time.

It would be wise to protect yourself against such an eventuality. Take precautions against a loss of production time and volume by learning the *alternate* tool steels for your jobs. Get familiar with them—just what they'll do and how they're handled. Frequently the alternate can step into the job with no loss of performance; in a great many cases, a steel can be found that will out-perform the original.

● But play safe—know the alternate tool steels for the types you customarily use. Our Engineering Staff is at your service.



Allegheny Ludlum
STEEL CORPORATION

GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

They also Serve

WHO CONSERVE

Long before the War RMC PLASTIC helped the Railroads Conserve Steel. It is on the Job Today . . . More Than Ever Before!

Steel rails are the arteries of railroad transportation, and the Railroads which are conserving steel in rails are doubling the value of their war effort. Many roads are saving thousands of tons of steel every year with RMC PLASTIC, because:

RMC PLASTIC prevents kinks and humps by thoroughly lubricating and protecting every joint fastening and surface. Joints with proper bolt tension so lubricated do not "freeze" but can expand and contract properly—so that rail-end batter is reduced.

RMC PLASTIC will prevent corrosion indefinitely with one simple application and prolong the service-life of rail, joint bars and fastenings.

RMC PLASTIC prolongs the interval between joint renewals, reducing maintenance expense and releasing vital labor for work elsewhere.

RMC PLASTIC does a BIG JOB at Little Cost!

As illustrated, it is quickly and easily applied:

- 1 Moulded blocks of RMC PLASTIC, 12-in. long, are laid on inner faces of joint bars before assembly—four for a 4-hole joint, six for a 6-hole joint.
- 2 Joint bars are applied in the regular manner. Bolt threads are thoroughly coated with the lubricant as the bolts are pushed through and taken up.
- 3 As the bolts are tightened, the pressure forces the plastic preservative compound into all voids in the joint area and packs them solidly.

NO HIGH PRIORITIES ON RMC PLASTIC

**You Can Get All You Want
When You Want It!**

RAILWAY MAINTENANCE CORP.
PITTSBURGH, PENNSYLVANIA

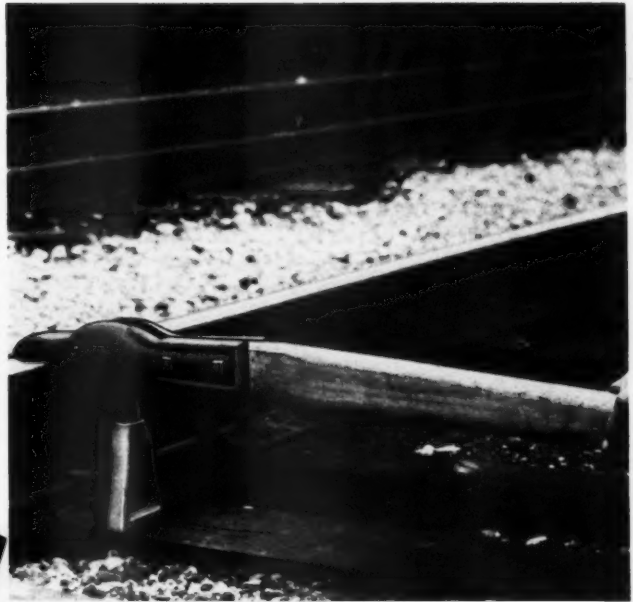
End CORROSION HERE

WITH

R M C PLASTIC

**IT'S TIME TO
SHIM YOUR TRACK**

**SAFEST,
QUICKEST,
EASIEST
WAY...**



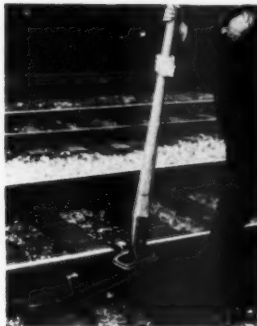
The LIFTER of the ONE-MAN TRACK TOOL is ideal for shimming track—one man can easily and quickly lift the rail with this tool. No picking or digging is required—the ballast is not disturbed. The lift is perpendicular—the rail drops back into place without disturbing the alignment.

The LIFTER is also a labor saving tool for raising the rail in connection with inserting or removing tie plates, picking up low joints and renewing cross ties.

ONE-MAN TRACK TOOL



The LIFTER is easily converted into TRACK LINER or TIE SPACER.



Necessary accessories for conversion can be purchased as working schedules require.

3 Tools in One

The ONE-MAN TRACK TOOL is a multi-purpose tool, especially needed by the wartime skeletonized section forces to enable them to do the necessary jobs which previously required larger gangs. The tool is easily and quickly converted from LIFTER to LINER or TIE SPACER and *operates on all sections of rail*. It is not fastened to the rail or track and its firm grip on rail and scientifically balanced levering power keep it solidly in place so that it cannot slip or kick out. It is sturdy in construction, light in

weight and operated by only one man. It saves manpower, reduces man hours and maintenance costs.

If you do not order the complete ONE-MAN TRACK TOOL at this time, we suggest you order the LIFTER at once for shimming, have it on hand in the spring for changing out tie plates and for tie renewals, and, in season secure the required parts for the Track Liner and the Tie Spacer.

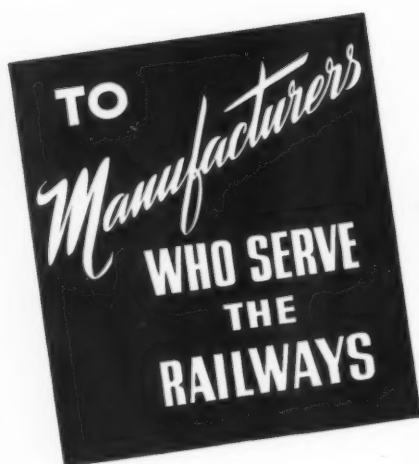
Write for descriptive circular

CARTIER SUPPLY COMPANY

G. M. HOGAN, General Sales Agent

327 South La Salle Street

CHICAGO, ILLINOIS



"A Service Man"

"Bill, I don't see why you should have to spend so much time on the road for a while," said the railway sales manager to his star salesman.

"Why do you say that, Boss?" replied the star salesman.

"Because we've so little to sell. We don't *have* to solicit orders now—they'll come to us."

"If they have to, yes. But orders aren't our main object now."

"What is it, then?"

"It's good will, Boss. These men have been customers of ours for years—they gave us orders when they meant a lot to us—and now when we can't deliver some of the things they need so badly, we can't run out on them."

"What can we do?"

"We can do a lot. We can help them get the most from our equipment; when it begins to wear out, we can show them how to repair it to extend its life—sometimes we can help them locate spare parts. There's a *lot* that we can do to help them keep our equipment going until this thing's over and we're back in full production again."

"You mean that you're a service man now?"

"Yes, a *super-service* man."

"But what are we getting out of all this expense?"

"A lot, Boss, in good will that'll bring big dividends when we need business again."

"I see your point, Bill. It's the best investment for future orders that we can make. It's smart selling."

"But that's only half the job. *You've* got to help too."

"What's the other half?"

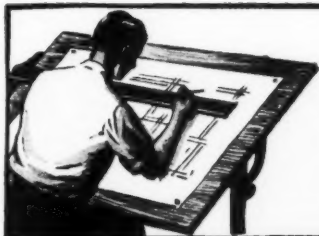
"More advertising in *Railway Engineering and Maintenance*. It'll put our story before them between my calls. And it'll reach the men whom I am never able to see—including a lot of new men who're being promoted."

"But these men don't have time to read, now."

"That's where you're wrong. You never see *that* paper in a wrapper. They carry it out on the line with them. They *all* read it. They've got to to keep posted, for conditions are changing so fast."

"You win again. We'll step up our space next year, for we've got a harder job to do. I'm glad you're using your head, Bill."

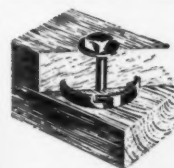
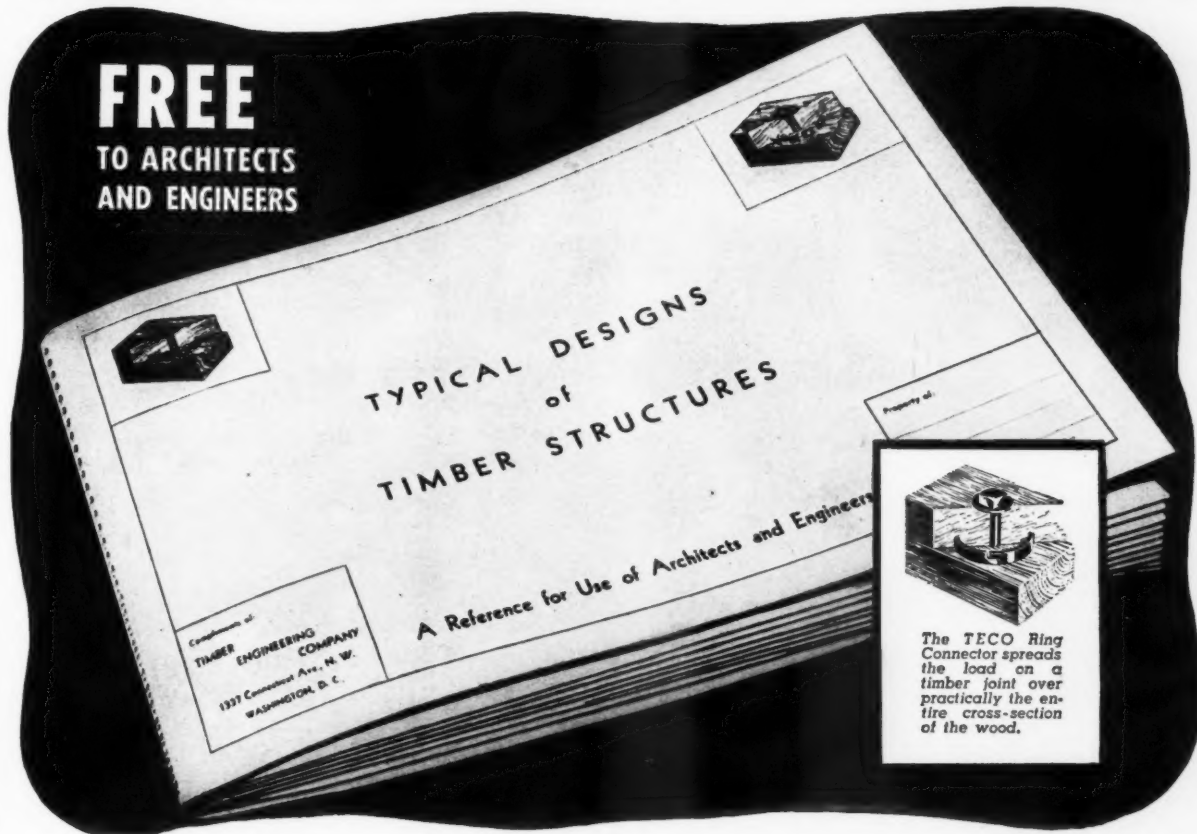
**RAILWAY ENGINEERING AND MAINTENANCE IS
READ BY MAINTENANCE OFFICERS OF ALL RANKS**



**"ONE OF THE MOST USEFUL PIECES OF
WORK THAT I HAVE RECEIVED IN 20 YEARS" ..**

WRITES ONE ARCHITECT

**FREE
TO ARCHITECTS
AND ENGINEERS**



The TECO Ring Connector spreads the load on a timber joint over practically the entire cross-section of the wood.

AND HERE'S WHAT SOME OTHERS SAY:

"An excellent reference book at a most appropriate time. Thank you!"

"These designs are a great time saver to the architect."

"Many thanks. Best thing I've seen. Much appreciated."

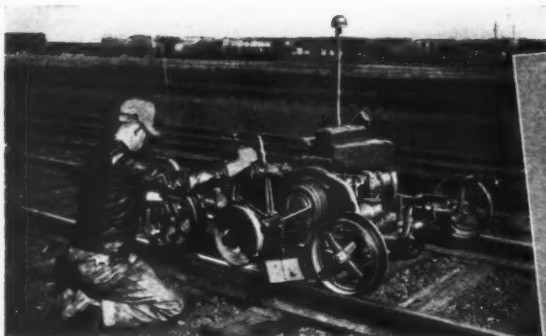
"A very commendable job in bringing data to the architect, of high practical value."

In **TYPICAL DESIGNS OF TIMBER STRUCTURES** we have grouped the plans of 45 representative types of timber structure that have been engineered by the **TECO System of Construction**. A request on your professional letterhead will bring you a copy of this valuable reference book.

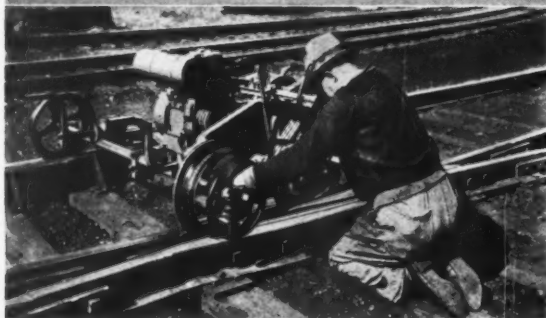
Timber ENGINEERING COMPANY

WASHINGTON, D. C.

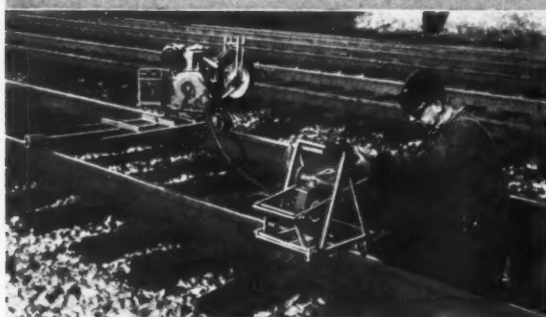
PORTLAND, OREGON



Heavy Duty Surface Grinder



Light Weight Surface Grinder



Utility Grinder



Midget Grinder

*Wherever rail grinding
has to be done there is a*
**NORDBERG
GRINDER**
specially adapted to the job

Nordberg Grinders have been developed to meet different grinding conditions, to do a better quality of work in less time and at lower cost. Whether it is the surfacing of rail reconditioned by welding, grinding flangeways, crossings, etc. removing flow at switchpoints and stock rails, rail end slotting, leveling cropped rail, removing mill tolerance, or grinding out corrugations and wheel burns, there is a Nordberg Grinder that will meet the conditions of your jobs. If it is heavy duty grinding requiring big capacity of ground joints per day or a light weight machine for working in congested traffic areas or a one man tool for use around terminals, yards, etc., there is a type of Nordberg Grinder that will fit in with your operations. A number of specially designed accessories are also available, making these grinders suitable to a wide variety of rail grinding work.

Select one of these grinders to keep your track in condition to meet the demands of wartime traffic.

**NORDBERG POWER TOOLS
FOR YOUR MAINTENANCE JOBS**

Adzing Machine	Spike Puller
Rail Drill	Power Jack
Power Wrench	Track Shifter
Rail Grinders	



NORDBERG MFG. CO. MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York



CAREFUL INSPECTION FOR DEPENDABILITY

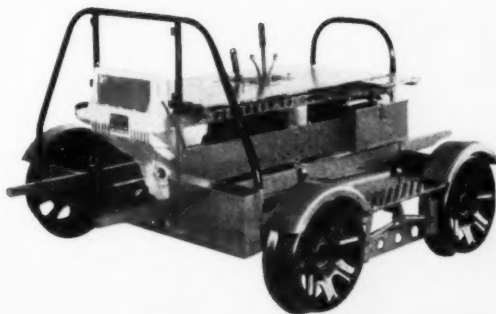
RAILROAD men appreciate the necessity of careful, regular watch inspection to assure utmost dependability—and Fairmont recognizes the importance of careful, expert inspection to assure you and ourselves that the product we deliver is built in every detail to Fairmont standards. Careful factory inspection is one reason for that well-known Fairmont dependability which makes Fairmont first choice by most of the men who use motor cars.

The car illustrated on the right is the Fairmont M19 Series E, 1 to 4 man spring mounted inspection car. Ample power is furnished by the RO 5-8 H.P. roller-bearing engine.

Fairmont offers you the most complete line of railway motor cars; a car for every requirement. Let us send you full information for your files. Fairmont Railway Motors, Inc., Fairmont, Minnesota.

Fairmont

Performance
ON THE JOB
COUNTS



OF ALL THE CARS IN SERVICE TODAY . . MORE THAN HALF ARE FAIRMONT'S

No. 168 of a Series

Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.

December 1, 1942

Subject: A New Edition of
The Railway Engineering
and Maintenance Cyclopedia

Dear Reader:

Late this month another edition, the fifth, of our Railway Engineering and Maintenance Cyclopedia will come from the press. As its name indicates, this triennial volume is a companion publication with Railway Engineering and Maintenance. The magazine brings you from month to month the current developments in the construction and up-keep of railway tracks and structures. The Cyclopedia carries on where the magazine leaves off, summarizing these developments over a three-year period into trends and standard practices.

The new book will be a volume of 1200 pages, 200 more than the last or 1939 edition. It has been thoroughly rewritten to record the many changes and developments in materials, equipment, and practices that have taken place in the last three years of revolutionary progress. Five new chapters have been added. Over 800 of the more than 2000 illustrations are new. In brief, the new edition is a thoroughly up to date book of approved practices in railway maintenance. It is bound in the same durable maroon fabrikoid as the last edition.

I am bringing the early appearance of this book to your attention now because of the fact that the last edition went out of print within three months of its appearance and since that time we have received hundreds of requests for copies which we have been unable to supply. Designed primarily for railway officers concerned with maintenance of way, the book has been in demand also by army and navy officers concerned with construction and by contractors handling such work. And in railway offices, the Cyclopedia has become the accepted source for reference, especially in these days of such rapid change when it has become necessary to develop substitutes for so many long-standard materials and equipment.

The new Cyclopedia will sell as heretofore for \$5 per copy, with graduated reductions for bulk orders delivered to one address (ranging down to \$3 per copy in lots of 50 or more). If you desire to insure that you receive one or more copies, I suggest that you write me promptly.

Yours sincerely,

Elmer J. Howson

Editor

1943

Railroad Operation

will be of the

Utmost Importance

Use

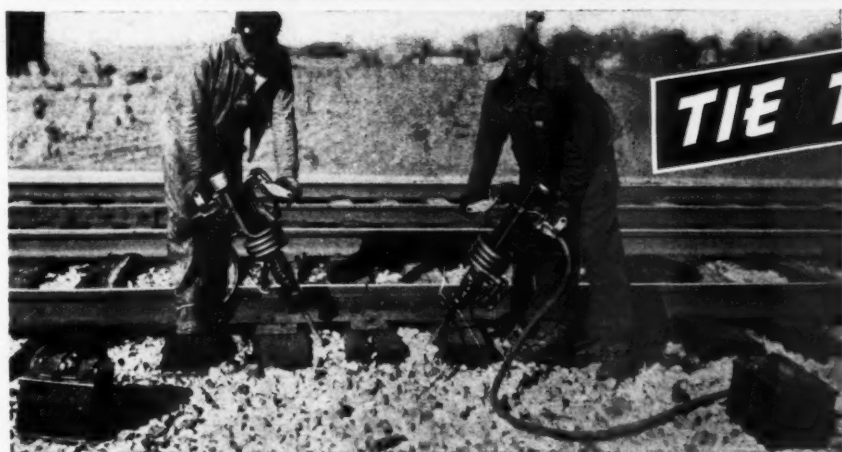
TYTAMPERS

For All Year Operation



ICE BREAKING

One BARCO ty-
tamper will break
up all of the ice
four men can re-
move.



TIE TAMPING

On 89 Railroads
—7 years' satis-
factory service.

BARCO MANUFACTURING COMPANY

1805 W. Winnemac Ave.

NOT INCORPORATED

Chicago, Illinois

In Canada THE HOLDEN COMPANY, LTD.

Montreal

Moncton

Toronto

Winnipeg

Vancouver

Waste Warden Tells HOW TO GET LONGER SERVICE

from your
Welding and Cutting
Apparatus

TORCHES

1. Blow out hose before attaching torch.
2. Be sure the torch seat is clean.
3. Be sure packing nut is tight.
4. Also—don't use torch as a hammer. A torch built to withstand such abuse would be too heavy to handle.

TIPS

1. Clean tips with proper size standard cleaning drills only. Be sure to use a drill one size smaller than the orifice about to be cleaned. Makeshift wire cleaners enlarge tip openings and upset flame balance.
2. Store all tips in racks to prevent damage. Tips battered at seating end waste gas.

REGULATORS

1. Keep regulator seat dust free. Before attaching regulator clean outlet by cracking cylinder; clean gland by a short blast from cylinder.
2. Release regulator adjusting screw when changing cylinders. This prevents high pressure shocks to regulator seat.
3. Always open cylinder valve slowly when installing regulator. Repeated sudden cracking of cylinder into regulator promotes leakage.



DON'T JUNK DAMAGED APPARATUS

Today regulators, torches and tips are hard to replace. Good maintenance practices will help you get longer service and better performance from your gas welding and cutting apparatus.

If a torch, tip or regulator is damaged, don't junk it—have it repaired promptly.

AIR REDUCTION

60 EAST 42nd STREET, NEW YORK, N. Y.

IN TEXAS: MAGNOLIA-AIRCO GAS PRODUCTS COMPANY

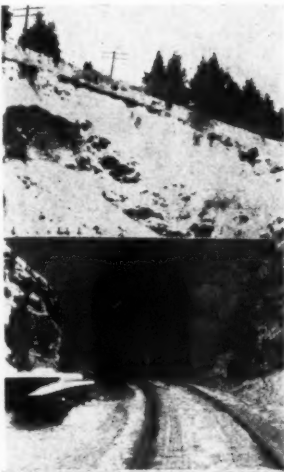


OXYGEN IS PRODUCTION — Don't Waste it!

Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

DECEMBER, 1942



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month by the

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LOS ANGELES
Union Bank Bldg.

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Business Manager



Oxy-Acetylene Pressure-Welded Rail Eliminates Batter and Joint Maintenance

● Continuous pressure-welded rails have established their worth in many ways: in tunnels, through station platforms, over bridges, and through road crossings. Installations made in open track are meeting expectations for economy and efficiency, indicating that pressure-welding should be considered for locations where difficult drainage conditions make joint maintenance costs excessive.

The Oxweld pressure-welding process for joining rail offers outstanding economies as well as a high-quality weld for rail. Welds made by this method require no additional materials—no products of a scarce or critical nature—in their making, and welding operations can be performed without tying up needed railroad equipment.

Since Oxweld's equipment for pressure-welding rails is limited, welding schedules should be planned now in advance so as to obtain full utility of available equipment through the fall and winter months and thus to have

your next season's pressure-welded rails available when needed.

Your Oxweld representative will be glad to give you the latest information on how pressure-welded rail can be used to advantage on your road.



THE OXWELD RAILROAD SERVICE COMPANY

Unit of Union Carbide and Carbon Corporation

Carbide and Carbon Building



Chicago and New York



Railway Engineering and Maintenance

Maintenance Men

Typify Loyalty of Railroad Employees

Spurred on by the initiative of a metropolitan newspaper in its leading city, the State of Nebraska staged a scrap collection campaign a few weeks ago that set the pace for the Nation. In that campaign the railroads led all other industries, furnishing a third of the 60,000 tons of scrap that were collected in the three weeks of the drive. In the northwestern part of the state, a master carpenter for the Burlington, B. C. Phillips, was made chairman of the campaign for his county, an area of sand hills and ranches with a population of only 1,327. In this county is a track laborer, Vernon Moran, who, on his own time and using his own car, brought in 96,953 lb. of scrap iron. Through his help Grant county won first place, with the collection of 637 lb. of scrap per capita. And Vernon Moran, section man, received a personal award as the state's best individual scrap collector.

In Chicago another metropolitan newspaper selected an Italian track foreman on the Illinois Central—Philip Limardi—as the workman in industry who made the most outstanding individual contribution to the Nation's war effort in that area during October. His contribution consisted in bringing to the attention of his management the possibility of releasing a crossover and a spur track that were no longer necessary, thereby enabling the road to replace an investment of more than \$4,000 with one of \$1,400 and, more important, making 56 tons of critical materials available for meeting urgent need elsewhere.

Typify Railway Spirit

These two incidents, involving the activities of maintenance of way men of the rank and file, typify the spirit of railway service. They are of the kind that caused a large mid-western railway—the Chicago & North Western—to select and feature a track-walker in its advertising to the public during the month. And they have led one of our largest builders of railway equipment to select a "track-walker" as its spokesman in a series of public relations advertisements which it inaugurated recently as a means of building good will for the railroads.

When speaking before the recent annual meeting of the Roadmasters' Association in September, Brigadier General Carl R. Gray of the United States Army said that "there is no better organized business in the world than a railroad. And there is no industry in the world that respects authority so much as the railroad industry."

Newspapers throughout the land carried the statement, a few days ago, of a leading columnist, a trained observer of topics of public interest and concern, that "one of the great jobs of the war is being done by our American railroads. Indeed, it may be the greatest of all our civilian war efforts in point of successful operation. It is the one enterprise that has not broken down or even faltered in the war effort. Without the railroads, our Nation would be sunk."

Comments such as this demonstrate the high place in which the public holds the railways and their employees today; they demonstrate also that, among these employees, it looks to the maintenance of way men of the railways as the symbol of loyalty and devotion to duty in foul as well as fair weather. This is the tradition of the maintenance department—it cannot be permitted to falter, but must be maintained, even though the going may be difficult in the days that are ahead.



Work Equipment—

Only Solution to Disturbing Problem

MAINTENANCE officers have experienced severe shortages of both labor and material during recent years, not because labor or material was not available, but because funds to obtain them were not available. These officers are again faced with shortages of both labor and material. This time, however, the situation wears an entirely different aspect from that with which they became familiar a decade ago. Then ton-miles were decreasing and eventually reached the lowest point in years; today there has been a continued rise in traffic, until ton-miles are now at the highest level in history, with every prospect that they will go still higher.

How does this affect the maintenance of track and structures? Near the depth of the depression, train schedules began to be shortened, until today trains are being operated at higher average speeds than ever before in railway history. Even if all schedules are lengthened, as has been discussed recently, and as some have already been, average speeds will still be far higher than they were ten years ago, or at any time earlier than ten years ago. There are, therefore, two aspects to the problem that maintenance officers must solve. On the one hand, the enormous increase in traffic is wearing rail, rail accessories and ties at an accelerated rate, making track maintenance more difficult. Likewise, higher speeds also tend to destroy line, gage and surface, so that both speed and traffic combine to make more labor necessary to keep the track up to the standard to which it must be maintained to insure the free passage of traffic that is so important to our armed forces.

On the other hand, although there is an increasing demand for man-power to accomplish the work that must be done, there is a decreasing supply of labor from which to draw, while in some classes the supply has already been exhausted. What can maintenance officers do to solve this paradoxical problem? During the difficult days of the depression, they learned the value of machine power as a substitute for man-power and, as funds became available, they bought work equipment as they had never bought before, until in 1941 more than 8,000 units were purchased.

Again, during the present year, despite priorities and other difficulties attending purchases, an unexpected amount of work equipment has been purchased. The War Production Board has recognized the necessity for keeping railway maintenance to a standard that will insure freedom from delay and consistent movement of critical supplies for the army and navy. It has also recognized that a fuller use of work equipment is the best and in many cases the only solution to the man-power problem, which is rapidly becoming as acute as that of securing materials.

Recent experience shows that if a road can present convincing evidence to the War Production Board that it needs work equipment, it can obtain the permission necessary for the purchase. Maintenance officers should bear this in mind and be prepared in good time to present this evidence, for they cannot afford to be late in filling their needs at a time when even a small delay may represent an opportunity lost. It cannot be denied that the shortage of man-power will be more pronounced next

year than any maintenance officer now in the service has ever known, and that only through the most intensive use of work equipment will he be able to succeed in maintaining his track and structures to the required standards.

Building Up Rail Ends—

Don't Overlook the Joint Bars

WITH war traffic continuing to increase, and with the prospects that the tonnage of new rail released to the railways in 1943 will be grossly inadequate for their needs, engineering and maintenance officers are greatly expanding their programs for rail-end welding this year and their prospective programs for next year. Fortunately for the railroads, much rail that is approaching the practical end of its service life may be carried over for several years more by such methods, although each year that it is continued in service increases the probability of other failures, which must be guarded against with increasing vigilance.

Methods of building up rail ends by welding in track are not new. They have been developed over a period of many years and have been thoroughly tried and tested on nearly every railroad in this country. The value of this work is well known and such work forms a considerable part of the yearly maintenance program on nearly every major railroad.

If the best results are to be secured, the building up of rail ends on old rail which is nearing the practical end of its service life must be accompanied by a program of joint bar rehabilitation, since the rail ends will soon return to their original battered condition if the bars are not renewed or rebuilt at the time the rail-end welding is done. This is particularly true today by reason of the record volume of traffic now passing over most lines. It is desirable of course to spot-surface the joints at the time the welding is done, but the joints and eventually the rail ends themselves will not remain in surface long if the wear on the fishing surfaces of the joint bars and the rail ends is not compensated for. Recognition of this fact prompted a committee of the Roadmasters' and Maintenance of Way Association to stress the importance of joint bar rehabilitation when building up rail ends by welding, in a report on Extending the Life of Rail and Fastenings, which it presented before the meeting of that organization in September.

The correction of joint bar conditions involves the renewal of the worn bars with new straight oversize bars or with new crowned bars having the proper amount of overfill, or it may consist of reforming or building up the old bars or of flame straightening the bars while in track. The first expedient—that of renewing the old joint bars with new ones at the time the rail ends are being built up, is now out of the question since, for all practical purposes, new joint bars can be secured only for new rail and to replace cracked or broken joint bars in service. The alternatives, therefore, are to build up, reform or flame straighten the old joint bars.

The building up of joint bars by welding requires careful work to insure the right amount of overfill. Reforming the joint bars requires that they be sent to a plant equipped with furnaces and presses and many of these plants are

now engaged to the limit of their capacity in war production. Furthermore, both methods require a pool of surplus joint bars if the work is to be done on an extensive scale and surplus joint bars are getting scarce. Also, the shipment of joint bars in any quantity requires the use of cars for company material, a practice, in view of the car scarcity, which must be kept to the minimum.

The other method of conditioning joint bars, by flame straightening in the track, is relatively new and has been tried extensively on only a few roads. In spite of this fact, these roads had flame straightened joint bars in service under heavy traffic for several years without any failures before the method was used extensively on their main line tracks. The method is fast and economical, and if applied in accordance with instructions by competent torchmen, taking care not to heat the steel above the critical temperature, it does not weaken the joint bar.

All of the methods of joint bar conditioning have features that recommend them for use under specific conditions. Certainly, in view of the rail conditions that the railroads are facing today, and the inevitable expansion of programs for building up rail ends by welding, serious consideration must be given to the rehabilitation of joint bars by one of the above mentioned methods. In giving consideration to these methods, maintenance officers who have not had experience with flame straightening joint bars on their lines will do well to give this method consideration for application on secondary lines, if not on high-speed main tracks.

Labor—

Now A Serious Maintenance Problem

DURING the last twelve months of war, maintenance men have been confronted with many new and difficult problems. Materials critical to the war effort have become increasingly difficult to secure and slow of delivery; certain types of needed work equipment have been frozen or have become unavailable—and now, the shortage of labor, both skilled and unskilled, has grown to such proportions that it is causing serious concern.

It is not as though maintenance officers have not expected and planned for their share of added problems with the progress of the war. In fact, long before the United States became directly involved in the war, they were discussing, both privately and officially, the implications of a serious war effort upon many phases of their work, and were adjusting their thinking and their planning to meet many emergencies. They figured, and knew from experience, that if, of the three prime requisites of adequate roadway and structures maintenance—materials, equipment and labor—one became scarce, they could turn to the others in increasing measure quite successfully and that if even two became scarce, they still could offset much of their losses with increases in the third. But what they feared and knew would be impossible of solution, is a situation of the character that is now developing, where all three requisites—materials, equipment and labor—are becoming scarce.

Through more intensive repair, reclamation and substitution, maintenance men are completing a year of outstanding achievement in the upkeep of their facilities,

in spite of the shortages that have prevailed in both materials and equipment. But faced with a continuation of these shortages, along with a serious shortage of the third requisite—labor—the prospect for equal achievement in the months ahead is anything but bright. In fact, the situation, from the standpoint of the adequacy of the fixed properties of the railways to carry the increasing war load with safety, and without delays, may well become a matter of real concern unless some relief is forthcoming.

That the labor situation was already a matter of concern early this last fall, and that it promises to become more serious in the months ahead, is evidenced clearly in addresses that were made before the recent annual meetings of the Roadmasters' and the Bridge and Building associations by Otto S. Beyer and Edwin M. Fitch, director and assistant director, respectively, of the Division of Transport Personnel of the Office of Defense Transportation—which addresses are presented, in abstract, in this issue. Both of these addresses, timely at the time of their presentation, are still more pertinent today, and warrant careful reading. In the many suggestions which they contain, maintenance officers will find much help—and they must find help, and find it promptly, or serious tie-ups of traffic in many parts of the country this winter, resulting from severe snow and sleet storms, are not out of the question, not to mention the problems of organizing adequate forces for the large work programs of next spring.

Significant among the suggestions made is that, having exhausted all means of securing replacements for their essential men of selective service age, the railways seek deferment from military duty for these men. To date, many railways have refused to ask such deferments, while thousands of their men have been called, and other thousands have volunteered their services. This was a laudable and justifiable policy so long as replacements or force adjustments were possible, and it did not jeopardize maintenance adequate to the war-time transportation needs of the country, but today, in the light of the serious man-power shortage developing for essential maintenance work, the wisdom, and even the patriotism of this policy may well be questioned. For such a position, there is support from no less an authority than one of the speakers referred to earlier—E. M. Fitch—who pointed out to those attending the annual meeting of the Bridge and Building Association that if they have men in essential operations who might be placed in Class 1-A, except for their occupation, or whom the railroads cannot let go because they are unable to replace them within a reasonable time, it is both their right and their duty to submit on Form 42-A all data which the selective service system requires for the making of decisions as to occupational deferment.

That there is instinctive reticence on the part of the railways to ask for deferment of their men, and resistance on the part of the men themselves to the acceptance of deferment for any cause, is readily understandable. However, with adequate transportation on the home front absolutely essential to military victory on the battle front, both the railways and their men, having exhausted all means of securing suitable replacements, must accept the admonition of Mr. Fitch, to the end that the railways—the service of supply behind the fighting front—will not fail to meet the war-time needs of the country.



For the Most Part the Crossing Work Is Being Carried Out by Section Forces. Although the Organization Shown in this View, Taken at Richmond, Va., Is an Extra Gang that Happened to be Available at the Point of Work

THE Seaboard Air Line is going "all-out" in its effort to co-operate in the national scrap-collection campaign, as evidenced by the program that is now under way on this road to take up all of its rail-type highway crossings. Thereby, a highly-productive source of scrap has been tapped, for this company has—or had—a total of 196 such crossings, which are expected to yield 2,500 tons of old rails. Once having decided on this step, the railroad, mindful of the urgency of the situation, determined to carry out the program with all possible speed, and, as evidence of this determination, a total of 82 crossings, yielding 855 tons of old rails, were taken up in September, the first month of the program. The remainder of the crossings are being taken out as rapidly as the necessary materials for replacement can be obtained.

Rail-type highway crossings have been in use on the Seaboard since about 1928. At that time the railroad was searching for a highly-durable type of construction that would be suitable for use at crossings carrying a high density of street traffic. The rail-type crossing proved satisfactory for such locations and was installed widely during the ensuing years, the installations being made largely in and about the larger cities on this company's lines, such

as Richmond, Va., Portsmouth, and Petersburg; Jacksonville, Fla., Tampa, and Miami; Columbia, S. C., and Raleigh, N. C.

In constructing highway crossings in recent years the Seaboard has more or less standardized on a type of construction employing a cold asphalt mix as the wearing surface, which is laid on a base course of crushed stone ballast, and it was decided to replace all the rail-type crossings with this form of construction. Since asphalt is classed as a critical material, whose use is under rigid war-time control, it was anticipated that some difficulty might be encountered in obtaining the asphalt mix required in replacing the rail-type crossings. However, in its efforts to obtain this material, the railroad has, for the most part, encountered a highly co-operative attitude on the part of the public agencies controlling its use.

How Asphalt Is Obtained

Control of the use of asphalt for highway purposes is now largely in the hands of the Public Roads Administration, acting through, or in conjunction with, the respective state highway departments. To obtain the material necessary for its crossing work in any given state, the procedure followed by the railroad is to indicate its requirements on a form furnished by the Public Roads Administration, designated as PRA-B-1, which is then submitted to the state highway department for its approval. As ap-

Rail-Type Go for

proved by the highway department, and when attached by the railroad to the order for the asphalt mix, this form becomes the authority for the supplier to fill the order.

It is apparent that the time required to obtain the asphalt mix is governed largely by the speed with which the railroad's requests are acted on by the highway departments. Generally speaking, there has been little delay in obtaining such action, although some states have been slower to act than others. It is a fact, however, that the speed with which the crossings are being taken up is being governed by the rate at which the cold mix can be obtained. In certain instances, to avoid excessive delay, the railroad has authorized the use of a material consisting of a crushed natural asphaltic rock. This material, which is not on the critical list, is obtainable without any delay.

Work Is Given Priority

The instructions to the local forces regarding the crossing program are to give this work priority over all routine activities. In other words, when a consignment of the asphaltic material has been received, the necessary forces are diverted immediately to carry out the crossing work for which it was obtained. As a rule, the work of replacing the crossings is being performed by the section gangs, doubled up, if necessary, to obtain crews of the necessary size, although the policy is to employ whatever forces happen to be available at a given time and location. For instance, at Richmond, where the program was inaugurated, an extra gang of about 35 men was available, and was assigned to the task of doing all the crossing work in that city. Incidentally, there were 10 rail-type crossings at this location, and all of them were replaced between September 1 and 15. From these crossings the railroad realized 726 ft. of 100-lb. rail, 1,766 ft.

Highway Crossings Scrap on the Seaboard

Materials for Victory

No. 6 of a Series

The accumulation and shipment of scrap to the steel mills in sufficient quantities to keep them functioning at capacity, is one of the important problems in our war program. The railroads in general, and particularly the maintenance of way forces, have been outstanding in their efforts to locate and recover scrap. Typical of such efforts is a program on the Seaboard, still under way, to remove 196 rail-type highway crossings and release approximately 2,500 tons of scrap metal for war purposes.

of 75-lb. rail and 10,135 ft. of 60-lb. rail, all of which totalled more than 120 tons of steel scrap.

How Work Is Done

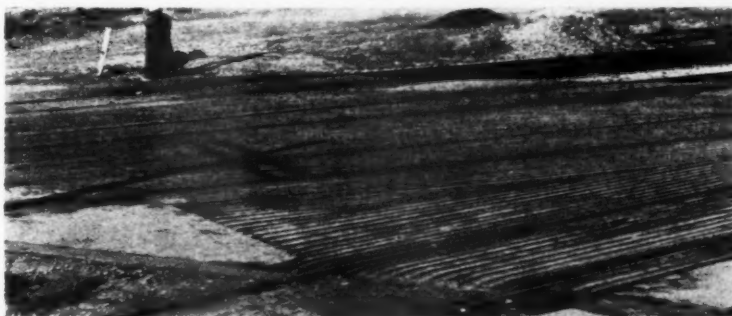
In carrying out the crossing work at a given location, the practice, after removal of the rails, is to crib the track and renew any ties that are not in sufficiently good condition to last several years. After the track through the crossing has been brought to the proper line and surface, it is rebalasted, adding sufficient crushed stone ballast to form a suitable base course for the asphalt wearing surface. This ballast is so placed, between and outside the rails, that it has a crowned section extending between or to the edges of the rail bases. The crown of the ballast in the base course is brought to a level about two inches below the running surfaces of the rails. The asphaltic wearing surface is then applied to a level surface even with the tops of the rails and is compacted with hand tampers or rollers. No provision is made for flangeways when applying the asphalt mix; these are formed by the action of the car and locomotive wheel flanges when the first train passes over the crossing.

Rails that have been released from a given crossing are taken to a convenient spur track for loading, and as soon as sufficient rails have been accumulated to make up a minimum car load a car is billed and the rails are loaded. In this connection, the fact that the rail-type crossings are mostly concentrated at certain points has simplified somewhat the problem of handling and loading the rails. All the released rails are shipped to the company's scrap dock at Portsmouth, Va., where they are sold as scrap.

Program Is Unique

As a means of obtaining scrap metal, the undertaking described in this article is unique in the sense that

it involves the replacement of existing serviceable facilities solely for the purpose of releasing the material that they contain. The work described in this article is being carried out under the supervision of the respective division engineers on the Seaboard.



Right Above—This Is One of Ten Rail-Type Crossings At Richmond that Were Removed. Right—The Same Crossing After the Rails Had Been Replaced with Asphalt Construction

Labor Problems

Stalk Maintenance Forces

Shortages Ahead for Track Men*

By Otto S. Beyer

Director, Division of Transport Personnel
Office of Defense Transportation,
Washington, D. C.



SINCE Pearl Harbor, our national economy has undergone drastic changes. This has come about in part because the fortunes of war have deprived us of raw material resources, such

as rubber. In the main, however, our economy has changed because of the very nature of total war.

It is unnecessary to stress this development, since we are all well aware of the inroads which war has made upon our normal affairs. Everyday experience proves that shortages are becoming more and more common. In many respects, however, the manpower shortage is the most striking development that the war has brought.

As a matter of fact, we have only just begun to feel the impact of war on our supplies of manpower. Thus far, critical shortages have appeared in a relatively few occupations. Our army is growing by leaps and bounds and nobody can say for sure when the limit to its growth will be reached. Like Great Britain and Germany before us, we are coming face to face with the fact that modern war makes unparalleled demands upon a nation's pool of labor power.

An obvious point about the manpower situation is that supply cannot respond quickly to increased demand. It is likely that we may be able to alleviate some of our material shortages

by building new facilities and by developing substitute products. Strictly speaking, however, there are no substitutes for manpower and, within any short period of time, it is impossible greatly to increase the number of human beings of working age.

Still, something will have to be done, for we are not going to lose this war by permitting our mines and factories and transportation facilities to stop operating. I see two possible methods of meeting the impending manpower shortage. One is to bring into the picture groups that have been outside the labor market in the past. In this category we have women and certain minority groups. As the war continues, we are going to have more and more women doing jobs that formerly belonged to men. We are also going to extend the range of occupations open to minorities. The second method is to make effective use of the labor power we have. These two programs are not mutually exclusive. Both will be necessary in the months ahead.

The manpower problem presents itself in a different light as we pass from industry to industry and even as we go from one part of an industry to another. Your manpower problem in the maintenance of way department is not the same as that in the maintenance of equipment department. It follows that there is no overall solution. The things that must be done will have to be done within the framework of each situation.

Will Grow More Serious

Accepting the fact that the manpower problem in your department is serious and is going to become more so, what is to be done about it? I believe it will be useful first of all to dispose of some things which bear

upon the whole picture but which should not be the basis for any wishful thinking. I refer specifically to the question of selective service requirements. Frankly, it is idle to place dependence upon deferments from army service as a means of solving the manpower problem. Local selective service boards have almost exhausted their lists of 1-A men. At the same time, the armed services are in the midst of a vast expansion. Clearly, the result will be a reclassification of men who had been deferred previously.

There has been some misunderstanding in the past on the question of occupational deferments. It seems to have been the impression that an occupational deferment brings an exemption from military service. The fact is that occupational deferments are allowed only to give the employer a reasonable opportunity to find replacements for employees who would otherwise be called immediately. With one minor exception, there are no outright exemptions from military service.

A more promising avenue of approach is the recruiting of new personnel from sources which had not been tapped previously. So far as your own problem is concerned, however, I am not so sure that there is any easy answer here. For example, we are looking very thoroughly into the question of using women to handle jobs which have usually been done by men. However, I have yet to hear any suggestions that this can be done to any great extent in railroad maintenance of way.

In some sections of the country it may be possible to help matters somewhat by importing laborers for the period of the emergency. This is not a solution which I recommend, nor is it one that can be applied generally. In addition to the numerous difficulties which inevitably accompany a movement of men from one area to another, we might as well face the

(Continued on page 895)

*Abstract of an address presented before the annual meeting of the Roadmasters' and Maintenance of Way Association in Chicago on September 17.

On Every Hand

Representatives of the Office of Defense Transportation, speaking before the recent annual meetings of the Roadmasters' and Bridge and Building Associations, outline the situation ahead and offer concrete suggestions on how to hold men, secure maximum production and offset losses. With the labor situation becoming progressively more tense, the advice and admonitions contained in these addresses are even more pertinent today than when originally presented in September and October



The Greatest Difficulty With Track Labor Will Likely Arise in Filling the More Skilled Jobs

B. & B. Forces Face Problems Too*

By E. M. Fitch

Assistant Director, Division of Transport Personnel
Office of Defense Transportation,
Washington, D. C.



Unfortunately, the manpower problems with which you were confronted a year ago foreshadowed only dimly the problems which confront you now. The most drastic change in this

respect has been brought about by the growth of our military establishments. Last year you had no need to be particularly concerned about the operation of the selective service act. This year it is one of your major manpower problems. Last year you had no personnel shortages that were worth bothering very much about. This year you are faced with serious shortages among certain skilled workers and, in some sections of the coun-

try, those shortages are even extending to common labor. Last year, women in overalls tended to be the exception. This year, women are the principal hope of expansion in a great many productive enterprises.

Considerable Shortage Already

In July of this year there were between 40,000 and 45,000 employees in the bridge, building and water service departments of Class I railroads. Of these, about 13,800 were bridge and building carpenters, 3,200 bridge and building painters, 900 bridge and building iron workers, and 3,900 bridge and building gang foremen of skilled labor. There were 4,200 employees who were operators of portable steam equipment and 1,900 pumping equipment operators. And, finally, there were 8,900 helpers and apprentices, some of whom were in maintenance of way, but the majority of whom were in the bridge and building department. From the manpower standpoint, the important thing about these employees is that the vast majority are skilled workers or skilled trades helpers, because it is among the skilled trades, for the most

part, that the greatest difficulty is being found in securing additional employees.

Recently the Association of American Railroads undertook a survey of personnel needs and training facilities among Class I railroads. The returns indicated that the Class I railroads, on September 15, needed about 5,000 men in bridge, building and water service occupations. This number of unfilled vacancies is equal to nearly one-ninth of total bridge, building and water service employment as of the last month for which figures are available. This situation is serious enough. Moreover, the personnel shortage situation is likely to become worse unless strenuous efforts are made to make it better.

Insofar as the reports are correct, you have no shortage problem among bridge and building foremen, bridge and building iron workers, portable steam equipment operators and helpers, and pumping equipment operators. Your shortage problem, as shown by these data, is confined to bridge and building carpenters and painters, bridge and building helpers and apprentices, and bridge and building laborers.

I have not mentioned skilled water service workers. These are reported within the group, "masons, bricklayers, plasterers and plumbers." Although the number of current vacan-

*Abstract of an address presented before the annual meeting of the American Railway Bridge and Building Association at Chicago, on October 21.

cies in this group is small, several railroads mentioned specifically that water service pipe fitter jobs were becoming increasingly difficult to fill.

Ninety-six per cent of the vacancies reported are in the four occupations that I have mentioned—bridge and building carpenters and painters, helpers and apprentices, and laborers. Your immediate concern, therefore, must be with these groups.

Most of your losses of employees result either from induction or enlistment in the military forces, or from transfer to other industries. It is usually true that transfers to other industries are by far the more important of these two. You can do something about both of these matters.

Possible Deferments

Among the advisory instructions which had been given to all local selective service boards is an occupational bulletin bearing the title "Transportation Service Activity." This bulletin lists essential occupations in transportation under each of its branches. The railroad list includes 116 occupations. In that list are bridge and building and water service foremen, bridge and building iron workers, bridge and building painters, pipe fitters, plumbers, time keepers, welders and operators of the heavier types of portable equipment used in bridge and building operations. If you have men in these occupations who might be placed in Class 1-A, except for their occupation, or whom you cannot let go because you are unable to replace them within a reasonable time, it is both your right and your duty to submit on Form 42-A all the data which the Selective Service System requires for the making of decisions as to occupational deferment.

You should take Form 42-A very seriously and fill it out as completely and fully as you can. Make it apply as much as possible to the individual for whom you are requesting deferment. Never make the mistake of having the form a kind of carbon copy of a 42-A for another man in the same occupation.

There is also another highly important consideration in connection with occupational deferment. To obtain deferment, it is not enough that an employee be a necessary man in an essential occupation in an essential activity. There must also be a shortage of available personnel in the essential occupation such that the employee in question cannot be replaced within a reasonable time. No argument is more compelling with local selective service boards than a showing that you have turned yourself upside down in a serious attempt to recruit

and train the men that are needed for replacements.

The problems created by transfers to other industries and the necessity of expanding your forces are far more difficult than those raised by selective service. In this regard, the importance of regularizing maintenance operations is extremely pertinent. The more you can regularize the fewer men you need, and the more attractive you can make their jobs, the simpler your problems will be. I have been told that maintenance operations are sometimes controlled by month to month budget-making, which makes it difficult to keep maintenance of way workers employed



Without the Necessary Skilled Forces, Essential Bridge Work Would Be Seriously Handicapped

continuously. To the extent that this situation may exist in the bridge, building and water service departments, I hope you are using your influence against it.

You should give consideration to a greater amount of pooling of employment in maintenance operations. There should be similar pooling arrangements between maintenance-of-way and maintenance of equipment forces. This pooling could even be extended to include several railroads within a given area.

Recruiting Problems

In spite of all you can do in this respect, you will still have a problem of recruiting, and possibly a problem of training. In dealing with this problem, I think that you should first exhaust all possibilities of locating applicants through the Federal Employment services. In the second place, you should try to fill your employee ranks with as many men with both wives and children as you possibly can. In the third place, if you have not already done so, you should throw

overboard the maximum hiring age limits which have been traditional in the railroad industry in the past.

I should also like to say a word for increasing the employment of negroes in bridge, building and water service work. The employment of negroes creates problems to be sure. However, many employers have been able to solve these problems and the railroad industry should be able to do as well.

Women Workers

The personnel survey now being made by the Association of American Railroads included questions as to occupations in which women are employed. I have examined all of the returns that are in to date, and have yet to find that even one woman is employed in bridge, building and water service work. During the last war there were very few. Some, however, were employed successfully as pumpers, and could, undoubtedly, be so employed again.

I grant that the manpower situation will have to become rather desperate in this country before women employees appear in any large numbers in your departments. At the same time, it would be well to canvass your jobs carefully to determine whether there are not some in which women could be suitably employed.

Must Work Together

The Office of Defense Transportation is urging all employers in the transportation industry to undertake planned personnel programs on a basis of careful inventories of their own personnel situations. Several railroads have already begun to make personnel inventories. Combined with estimates of future employee needs, such personnel inventories will go a long way in enabling you to plan wisely in meeting problems of personnel shortages.

Finally, we are interested in increasing the effectiveness of the existing staffs of transportation employees. An important means to this end exists in programs of labor-management co-operation which were begun on the railroads many years ago, and which ought to be extended to the entire industry today. Time and again it has been seen that when employees are given a systematic means through which to express their ideas about increasing efficiency and preventing waste, they not only contribute good suggestions, but they also take a greater and more favorable interest in the company for which they work.

The Division of Transport Personnel hopes to be able to assist the railroad industry in meeting its man-

power problems. We will have to work together if this job is to be done. And, working together, we will do our level best to insure that manpower shortages will not result in any "slow orders" to the railways or in the transportation industry as a whole.

Shortages Ahead For Track Men

(Continued from page 892)

fact that labor shortages are going to become more and more general.

There may be sources in your own localities which have not been fully explored and there may be agencies which have not yet been called upon for aid. I am not informed as to the extent to which the railroads have utilized the United States Employment Service, but this agency has more than 1,500 local offices and more than 20,000 staff members, and its services are worth investigating.

Lower Requirements—Train Men

Again, if age or physical requirements operate to disqualify applicants who might be able to handle a job satisfactorily, these requirements may be modified and made more flexible. This is a matter which must be worked according to the circumstances of each individual case, but it may offer at least a partial solution to the problem.

Another possibility, and one which I think has not been sufficiently examined, is to level out the peaks and valleys in maintenance operations. In the past it has been a fairly common practice to schedule peak maintenance operations at the same time of the year as demands for labor in agriculture reached their highest level. So long as we had a large surplus of labor, no particular harm resulted from this. Now, with labor shortages hampering the harvesting of crops, it will be well to develop plans for avoiding the coincidence of peak requirements of labor.

Adequate training programs can be of the greatest assistance in the rapid adjustment of new workers to their jobs, and for that reason the subject cannot be overemphasized. The vast majority of maintenance workers do not need the kind of intensive instruction which is usually referred to as training. However, all maintenance work by no means falls into the unskilled labor category, and it is likely that your greatest difficulty will not be in trying to replace unskilled men, but rather in seeking men to fill the

more skilled jobs. In these occupations, sound training programs can be of considerable help. My recommendations on this score are twofold.

Recommends Two Courses

First, it will be necessary to attempt to fill all vacancies by upgrading. This is true not only because of the over-all labor shortage but also because a much shorter training period is ordinarily required when a man comes with a background of experience in related work.

My second thought relates to the assistance which certain government agencies can give in preparing training programs. In the federal government, all training services are now located in the Federal Security Agency. Of these, at least two deserve your particular attention. One is the so-called training-within-industry service, which places special stress upon the training of job instructors and foremen, on the theory that teaching other workers requires certain technics which the average supervisor or foreman has not an opportunity to obtain. The other agency is the apprentice-training service, which is concerned chiefly with long-term training through an established apprenticeship system. Its staff is aware that apprenticeship training, like everything else, has got to be speeded up during the war. The field men, therefore, work with the training-within-industry service in helping to work out training programs which can be completed in shorter periods of time than the customary apprenticeship term.

It is my impression that the transportation industries have been a bit shy about going beyond their established training practices. This probably follows in part from the fact that the need for new training methods has not been great in recent years. At present, nonetheless, I feel that they are missing a bet if they fail to investigate the possibilities of the various aids which the government is willing to supply. Even if these programs do not precisely fit the needs of transportation they can be tailored or adjusted.

Sound recruiting and training programs are necessary and helpful. In your case, you may be able to do something about stabilizing operations at a fairly constant level throughout most of the year, thereby avoiding large-scale labor requirements during certain months. But all these things have their limitations, and certainly no one of them is going to be a complete answer to the problem. I think it is clear that whatever can be done in these directions must

be supplemented by a program for making the most effective use of the manpower you will be able to get.

Improved Methods Answer

I am not suggesting that hours of work can be lengthened very much or that employees can be asked to do a great deal more actual manual labor than in the past. The evidence is conclusive that these methods of stretching out labor have very definite limits, aside from the general undesirability of overburdening or overworking men. I know also that during the war we are not going to be able to get significant amounts of new labor-saving machinery to offset the scarcity of labor power. The answer has to be found in improved methods and organization for doing the job under pretty much the same conditions as before.

Management and supervision can do a lot along these lines. I have no doubt that they have already made substantial progress and that they will make more in the future. Employees also can play an important part in improving their own jobs. I believe strongly that an alert and co-operative working force can be of very considerable assistance in meeting the manpower problem.

Of course, employees are not going to do a more effective job merely because somebody wishes that they would do so. It is necessary to develop definite procedures and mechanisms for this purpose. Most of all, you want to make employees aware of their important place in the whole war picture and to arouse their interest in improving the operations with which they are concerned. Beyond that, you need some machinery which will encourage them to offer any ideas and suggestions they may have. In other words, it is essential both to raise employee morale and to increase the extent to which employees can participate actively in bettering their own jobs.

To sum up, I have dealt briefly with the general manpower situation as we see it today. The picture is not good by any means, but there surely is no reason to throw up our hands in despair. I have tried to outline the various ways in which the problem can be attacked, and I have sought to emphasize that we cannot afford to concentrate on any one front to the exclusion of the others. Recruiting, training, stabilization of operations, more effective use of manpower—these are all pieces in the puzzle. I believe personally that they will be fitted together properly and that we will be able to carry on reasonably well in the difficult months ahead.



Materials—

The Outlook—

And What



David P. Beach

WPB Says, "Cut Requirements"

By David P. Beach

Assistant Chief, Maintenance Equipment Section
Transportation Branch, WPB, Washington, D. C.

EVERYONE knows that adequate and efficient transportation is vital to the successful prosecution of the war, but the job right now is to see that the railroads function properly and are maintained with a minimum amount of strategic materials. It is a job that is going to require ingenuity, resourcefulness and vision. The amount of critical materials set aside and available for purposes other than munitions and ordnance has been constantly shrinking with the speeding up of the war program, and now is so small as to become a matter of grave concern. Maintenance requirements must be provided first, with essential expansion or new work getting what is left.

The common problem is to maintain facilities on an absolute minimum basis in order to make available a portion of the critical materials for urgent expansion. Plans for expansion must be designed with only one

object in view, and that is to meet the emergency with the use of the least amount of critical materials. Ordinarily, the term "absolute minimum basis" does not need any amplification. Usually, this term is associated with cutting operating expenses to the bone, as in the depression years of the 1930's. Today, the railroads must handle an unprecedented volume of traffic, but the same yardstick must apply with reference to the use of materials, nearly all of which are now critical. Lumber requires an emergency rating of AA-2X for reasonable delivery. Bridge, structural and reinforcing steel cannot be procured without a rating comparable to army and navy ratings. Clay products are about the only non-critical materials; and in some sections of the country it is difficult to get reasonably prompt delivery on cement.

Instructions Not Enough

Of first importance in considering this problem of conserving materials is a full realization of the responsibility of every individual who has

anything to do with the ordering or the use of materials. The successful results of the safety movement were accomplished by constant and energetic education in safe practices. The drive to conserve strategic materials for war purposes overshadows any drive in the history of railroading. More vigorous action is required than simply putting out instructions. Everyone has the "must win the war" spirit, but leadership and co-ordinated efforts are essential to success. It is obvious that this job of saving precious material for guns, ships, tanks and ammunition must be done by those at home, and not in Washington. The functions of the Transportation Branch of the War Production Board are of a policing nature to see that nothing slips by that isn't vital to war efforts, and to assist the railroads in getting what is vital in the war program. The wasteful and unwise use of critical materials should be dealt with as any other infraction of the rules.

To maintain the railroads on an absolute minimum basis under present conditions will require the exercise of good judgment in the use of materials. Every person using or ordering materials, from the mechanic to the storekeeper, will become material minded in doing his part, if called upon, in the all-out war effort. Facilities which have become obsolete and are more or less worn out, and repair parts which are no longer obtainable, may be on programs for renewal. A special examination of such facilities by a qualified inspector may disclose means to keep them safely in service a few years more by patching.

The question to be answered in every such case where renewals seem necessary is, "Can they be made to last a while longer?" Such a procedure may not be the wisest expenditure of money under normal operations, but critical materials are priceless today.

To maintain on an absolute minimum basis requires the use of all salvageable second-hand or fit materi-

Can Be Done About It

als. A careful "out-of-face" inspection should be made of each railroad and branch line and an inventory prepared of facilities that are unused or can be abandoned. The best results from such inspections can be obtained by well chosen material representatives who know how to search out every cubby hole and corner, not overlooking abandoned water lines or pipes.

To maintain on an absolute minimum basis, bridge programs must be prepared on the basis of repairing and patching structures where necessary to keep them in serviceable condition for the duration. Anything beyond this, such as the replacement of spans, should be made only after a rigid inspection and a thorough analysis of traffic conditions. To maintain existing structures under this policy will require closer and more frequent inspections and supervision to see that crucial defects are repaired immediately.

"As Usual" Methods Out

Many project applications received from various railroads in the country for bridge repairs and renewals were evidently prepared on the "as usual" basis and had to be returned for revision, cancellation or review for the purpose of eliminating critical materials. The railroads have responded with hearty co-operation in meeting this issue. Changes have been made in design to cut to a minimum the amount of steel to meet traffic requirements for the next few years, saving a considerable tonnage of steel. Temporary methods have been employed to continue in service spans which ordinarily would be replaced. Reinforcing steel has been eliminated by redesigning concrete substructures to use mass concrete. Where steel must be used, efforts should be exhausted to use second-hand or scrap materials, or a canvass made of supply houses for materials in stock which can be adapted to the purpose. Any bridge design that requires spe-

cially rolled plates and shapes requires an emergency rating with an indefinite date of delivery.

Materials for railroad maintenance are handled under Order P-88, and the provisions in this order are intended to maintain facilities in sound working condition. Railroad purchasing agents make their requests for maintenance materials on Form 351. They must depend, however, upon maintenance forces for correct

Abstracts of four addresses presented in a symposium before the recent annual meeting of the American Railway Bridge and Building Association in Chicago, bringing together the views of the War Production Board on the outlook for critical materials and the need for conservation, and the thoughts of three railway officers representing the bridge, building and water service departments, as to how those engaged in construction and maintenance can best co-operate. All agree that conservation, through proper design, substitution and reclamation, is essential, and each urges that maintenance and construction men co-operate to the limit of their ability

information as to their requirements.

The responsibility, therefore, rests with the maintenance forces to see that these requirements are on an absolute minimum basis; or there will be nothing left for essential new work.

As Seen By a Bridge Man

By J. B. Hunley

Engineer of Structures
New York Central System, West of Buffalo,
Chicago



J. B. Hunley

THE situation as to the maintenance of our bridge structures becomes more critical with the freezing of each new item of critical structural material. In the beginning it was rather an interesting game of matching wits with Washington. If some one thing was denied us, we could substitute something else, but that is becoming more difficult today. However, I am sure that we all now realize fully that we not only must, but should, work closely with those in Washington who are controlling materials, because, in the final analysis, we are all working toward just one goal—the goal of winning the war, and as speedily as possible.

Fortunately, bridge men are resourceful, that being one of their first qualifications, not only as a matter of necessity, since their work requires

it, but also because it is something in which they take great pride. During the last decade, when bridge appropriations were low, this trait was developed to the highest degree. The men who passed through this period are not only resourceful, but they are also tough.

Bridge Engineer Can Help

Today, money is far more plentiful than either labor or material. Under these conditions, the successful accomplishment of necessary structures work is finally going to depend upon these men and what little material is available—and it will require the closest co-operation between all concerned.

Since few, if any, new structures are now being built, or will be built for some time in the future, the bridge engineer can best spend his time giving every possible help to his maintenance men with their problems. He should see that questionable structures are inspected frequently and carefully, and, when possible, examine them personally, watching them under traffic. The stresses in light steel spans should be re-checked carefully to avoid repair or reinforcement if possible. He may find that he can "skate

on thinner ice" than has been his practice, if there is no marked sign of distress and his experience and sixth sense of what is structurally right permit him to do so. If repairs are found necessary, he must devise methods which will involve the use of the least new or second-hand materials, forgetting for the present that complete repairs, or a complete replacement, would be simpler and perhaps cheaper in the long run.

He should build up an ample stock of the less critical materials, which can be used in some way in emergencies, because emergencies may now occur more frequently and with less warning than heretofore. He should hold the use of scarce materials to an absolute minimum. If he must request some of these materials, his reasons

may be, they must work alone with the materials and tools which are supplied them. The longer I deal with such men, the more inclined I am to seek their advice rather than offer mine. But you have asked my advice, and I make the following suggestions to you.

Inspect your structures more carefully and more frequently, and if you find anything questionable about them, don't hesitate to consult your superior officers. They will not only want to help you, but will, particularly at this time, want to know everything that you can tell them about the condition of any structure which is being carried along on "hope and borrowed time."

Keep your power tools in good order, making "stitch-in-time" repairs

finished job may offend the eye, but, under the conditions, it will serve until something better can be had.

Other Suggestions

When heavy repairs to a timber structure become necessary, renew as much of the structure out-of-face as the material available will permit, saving the usable timbers removed for repairing other parts. Open up such a structure with gentle hands, as rough treatment may shorten by several years the life of any timber left in place. When your timber does not come preframed, re-check your field measurements before cutting it. As a further saving in steel, perhaps you may be permitted to use two or four fewer chord or drift bolts to the panel than your standards call for.

Check the track surface on open-deck steel spans, and, if possible, re-frame the ties so that the bearing between the rail and ties, and between the ties and steel is uniform and the track is in cross level. See if the center line of the track coincides with the center of the span; it seldom does, and frequently it is so far off that one girder may carry from five to ten per cent excess load. On short spans, try to get the trackmen to remove or build up all battered joints near the center, or better yet, substitute continuous rail. With all the other things you have to do, this may seem to be asking too much, but if they are done, the stresses in the spans will be reduced materially, which, in a borderline case, may postpone replacement or strengthening, or make a speed restriction unnecessary.

Have Answers Ready

You are probably all doing most of these things and many others besides, but we can't stop there. We may expect the material situation to become still worse before it gets better, and we must keep asking ourselves—What will I do with this or that bridge if I can't get needed materials?—and have the answer ready when the time comes that something must be done with what is at hand.

We have almost learned to do without new structural steel, although a small amount of this can still be had for repairs, if it's absolute necessity can be shown. Fortunately, it is frequently possible to fashion something from secondhand material that will serve the purpose, and the thought that, through your own efforts, you have saved a ton or two of steel for guns and ships will be so satisfying that the extra trouble and expense will be forgotten.

For some reason, steel reinforcing



When Repairing Timber Structures, They Should Be Opened Up With Gentle Hands to Avoid Damage to the Timber Left in Place

therefore must be so sound that they will be allocated in full, in so far as possible. However, no matter how favorable the prospects for securing such materials may seem, it will be well for the bridge man to have in the back of his mind some other scheme which can be used if his request is refused.

To do these things, the bridge engineer will be forced to toss overboard many ideas regarding design and maintenance which his long experience has proven sound. He will have to do many things which he knows are uneconomical, doing work which will soon have to be done over. After considering his education complete, he must master a new technic—the art of substituting untried methods and materials; the taking of greater chances, and knowing just when to stop.

Field Forces Have Biggest Problem

But the men in the field—the supervisors, foremen and mechanics—are faced with problems which are equally, or even more troublesome than those of the bridge engineer. No matter how expert or willing these men

to prevent the failure of any part, which, if it can be replaced at all, may take many weeks. Take special care of rubber hose, power cables, steel cables, manilla lines, etc. New equipment will not be available for some time, and with the evergrowing shortage of skilled men, and particularly of the younger men, present equipment becomes an imperative necessity, rather than a mere time-saving convenience.

Save and hoard every usable thing, whether you have use for it immediately or not, and make frequent visits to your scrap yards or reclamation plants. If you get there first, you will find many things, including old rods which can be straightened and converted into machine or drift bolts. They can also be used for concrete reinforcement. Small diameter pipe can also be used for concrete reinforcement.

If there are any light spans that are no longer fit for use anywhere, cut them up and save the plates and angles. While the expense to do this may seem excessive, the material can be worked over for repairs, particularly of lateral systems. Sections may have to be spliced or welded, and the

seems a little easier to obtain than structural steel, but, if necessary, we can do with a comparatively small amount of this material. We can't build long beam spans and structures made up of thin sections without reinforcing, but many of us have seen high walls and long span arches which were built without using a pound of steel, and to reassure ourselves that this can be done, we have only to examine a few of the fine old stone masonry structures that are still serving their purpose. Of course, this will require more concrete, but cement is still available, and I venture to say that with these thicker sections we will have less seepage than heretofore, with less disintegration from this cause. Some designers seem to have worked on the theory that if a few bars were good, more would be better. If this is true, perhaps it is time to begin a new cycle before our concrete structures become nothing more than steel frames whitewashed with cement.

For the lack of steel sheet piling, we shall have to re-learn the almost forgotten art of building cofferdams of timber, with which our predecessors constructed deep and difficult foundations successfully, and with pumping equipment which to us today would seem totally inadequate. For the smaller culverts, for which we have used cast iron or sheet metal pipe in recent years, we now have triple-strength vitrified pipe, which can be substituted in many instances.

Shortage of Timber

Of equal concern is the present shortage of timber. We have always had plenty of that, and in an emergency nearly everything could be fixed up temporarily with it. Until there is some promise of improvement in this situation, not a piece should be wasted. Those roads which use treated timber are also faced with another serious problem, due to the acute shortage of preservative. Much timber is now on hand for seasoning, and unless it is treated soon it will deteriorate rapidly, either in the storage yard, or subsequently in a structure. The only thing that these roads can do is to use what oil is available to the best advantage, treating the oldest material first, and hope for more to permit the treatment of the remaining material.

Just as we were again beginning to consider, after a lapse of 10 years, that paint, after all, is a necessity, it too has become difficult to obtain. This may be a temporary condition, due perhaps to the demand exceeding manufacturing facilities, rather than to a shortage of ingredients. But every bit of paint that can be obtained should

be applied so that we can pass through a probable future paintless period better.

These are some of the major difficulties that we bridgemen face. No doubt, there will be others. Even in times of plenty, many small items are difficult to assemble and have on hand when needed. Now they may not be obtainable at all. There will be discouraging delays and the shifting of forces from one point to another, while waiting for overdue deliveries

or to meet some emergency, and there will probably be restless nights as well. There will have to be more careful planning and laying out of work. We shall have to revise our ideas as to what is essential and what is non-essential. We must in some way learn to spread the little available material thinner than ever before, and become accustomed to doing things the hard way. But all of this should make the next one, two or more years the most interesting in any bridgeman's life.

As Seen By a Water Service Man

By G. E. Martin

Superintendent of Water Service
Illinois Central, Chicago



SINCE the water service departments of our railroads are substantial users of critical materials, we in these departments are in a position to contribute in a very definite way to the solution of the present critical material situation. Owing to the very limited amounts of certain raw materials available, our fullest co-operation will prove of great value to our country.

We must no longer expect satisfaction of all of our needs, and must realize that there are not sufficient raw materials to satisfy all requirements. The realization of this will necessitate the control of our desires to improve, and the use of all of our ingenuity to keep old plants operating as efficiently as possible for the duration. Plants that cannot be kept operating with present equipment should be replaced, but the wholesale installation of new plants should be avoided.

There are, undoubtedly, locations where, under ordinary conditions, it would be considered good practice to have duplicate pumping units. Today, at these locations, we should strive to "get by" with single units, giving special or extra attention to these units where this is deemed necessary. Possibly a few repair parts available for immediate use would, in certain instances, serve satisfactorily in place of a second unit.

With the increased movement of military materials and men, all railroad facilities are being subjected to heavier loads. Water supply facilities

are no exception. We have been called upon to restore plants that have been closed and to increase the capacities of others in order to supply locomotives with adequate, suitable water. Since the outcome of the war is dependent in a large way upon efficient rail transportation, it is essential that we meet these demands. To do this will, undoubtedly, require some additional equipment.

It is essential that those in government who are charged with the responsibility for allotting materials recognize this fact and give us the necessary aid to secure the amounts required. Failure to do this will, if carried too far, cause interruptions in railroad transportation which, in turn, will seriously affect our movement of men and materials.

It is our duty to make our requirements known in an effective way in order to avoid traffic delays. At locations where a thorough investigation develops the necessity for new facilities as the only way to provide water needed for trains, we should give consideration to the installation of facilities to handle only the present requirements. Facilities of sufficient capacity to take care of present requirements on railroads will, no doubt, be adequate for a long time to come.

Second-Hand Materials

Second-hand equipment and materials that are usually made available when plants are eliminated because of changed conditions, or from plants where modern equipment has replaced old units, are a source of repair parts. These will serve to keep similar equipment in operating condition at a comparatively small cost, as well as to eliminate the necessity for the purchase of new parts. It is necessary that some definite plan be

followed to secure the best results from the material salvaged in this manner. In my opinion, all water service material, excluding a working stock, should be assembled at one or two storehouses, where a water department representative should separate scrap material from material suitable for future use. Scrap material should be consigned to the scrap pile, while all usable material should be marked or tagged so that it can be identified readily by storehouse employees when filling requisitions. All of this latter material should be handled in the same way as new material, and should be carried in storehouse reports for the information of the users.

All abandoned underground cast iron pipe lines should be removed where it is economical to do so, stor-

for use at some future time, but was forgotten with the passage of time. Pumpers and repairmen should be impressed with the importance of sending such material to a designated point for reuse. Poor housekeeping or untidiness about plants, shops, tool houses and other places where materials are kept or allowed to accumulate is one of the most prolific sources of material waste. The elimination of the "junk heap" and a good housekeeping program will produce considerable amounts of much-needed materials—and no priority rating is required to secure such material.

Supervision and Substitution

The purchase by requisition of materials and tools for ordinary running repairs requires close supervi-

will serve; the use of steel where wood will serve; the use of rubber where paper or cloth will serve; and the use of heavy valves and fittings where standard weights will answer, are a few of the ways in which critical materials should be saved.

With the increase in railroad business, new men have been added to your organizations. These men require more training in the conservation of materials than some of the older men. The waste of material by inexperience and poor workmanship is probably one of the largest sources of waste.

The proper and constant maintenance of water-handling facilities does double duty—in saving material and in furnishing an uninterrupted water supply. The old adage, "a stitch in time saves nine," is highly applicable in the maintenance of water facilities. Making small repairs at the proper time will often save valuable material later. Maintenance men should be urged to be on the alert, giving all such cases prompt attention and not waiting until the part is damaged to the extent that new material is required. Much can be accomplished along this line, and too much emphasis cannot be placed on it. Men with the experience, judgment and energy to maintain assigned districts conservatively are invaluable, and will contribute in a large way to the conservation of materials.

Avoid Waste of Water

Water, while not classed as a critical material, does require critical material to produce it. Therefore the waste of water indirectly affects the use of critical material. The Illinois Central has long recognized the loss in this waste and was among the first roads to campaign against it. In the eyes of many people, water represents no particular value; consequently, the waste of it often goes unnoticed. Water in lakes and rivers does not represent any particular value, but when collected in a state suitable for use in a locomotive, it has a definite value. Therefore, it is evident that no waste of such water should go unnoticed. The water works man can control a large percentage of such waste. Hidden leaks reaching sewers are a source of large waste. The local maintenance man should be familiar with the location of all water lines and should check for leaks at regular intervals.

In our efforts to save materials or to substitute non-critical for critical materials, it is essential that we do not overlook the small things while looking for the large things. We should keep in mind that nothing is



The Current, Adequate Maintenance of Water Facilities Is Essential to Uninterrupted Train Operation, and, at the Same Time, the Conservation of Essential Materials

ing the pipe, valves and fittings at the storehouse for future use. If there are locations where the amount salvaged exceeds the road's requirements, its sale will eliminate the purchase of similar new material by someone else. This will directly benefit the critical material problem. Similar salvage efforts should extend to pumping machinery, steel water tanks, and other water department equipment. In certain cases where it is not profitable to remove old facilities, reports of the conditions and materials available should be made to the Government agency set up for assembling scrap, allowing that agency to reclaim the materials for reuse or for scrap.

Collect Discarded Materials

The collection of discarded materials at outlying pumping stations should not be overlooked. It is frequently found that considerable amounts of scrap brass and second-hand valves have been put away in lockers or other places by pumpers and repairmen. Material of this character was probably set aside initially

sion to prevent the accumulation of things not needed. With the increased time now required to secure materials there is an inclination on the part of some to secure sufficient amounts for a longer period than ordinarily would be needed. Such a practice should be discouraged, since it only serves to deplete the material supply further. Material purchased and stored for future use often deteriorates much faster than if used immediately. A carefully-prepared maintenance program, with special effort to complete the work recommended, will do much to help anticipate material requirements. The avoidance of non-essential work will also eliminate or defer the use of some material until conditions are more favorable.

The substitution of non-critical material for critical material presents a challenge to all of us in water service work. Much can be accomplished by an honest effort in this task. The fact that we have always used certain items manufactured from materials that are now very scarce is no reason why something else will not serve the purpose. The use of brass where iron

too small to save. Collectively, the small things saved will result in large savings. Our efforts in this regard will not only be helpful to our rail-

roads, but will give us a great deal of personal satisfaction in knowing that we are aiding our country in a time of her most serious trial and conflict.

As Seen By a Building Man

By O. G. Wilbur*

Appraisal Engineer,
B. & O., Baltimore, Md.



WITH the material situation changing almost daily, in which materials that are available today may not be obtainable tomorrow, perhaps the best answer to the serious question of

shortages now confronting us is the application of the engineer's ingenuity. Today we find ourselves doing things that, two or three years ago, or even during the period from 1931 to 1934, when most roads were just a jump ahead of the sheriff, we would not have considered doing. We have gone back to certain types of construction that were in vogue during the "Gay Nineties"—and, under the circumstances, why not?

There are several principal factors that we must keep before us very definitely in our job of keeping open the steel arteries of the great war production machine of our country. First, and most important, is the factor of safety—this must never be lost sight of. Second, and a close runner-up, is sanitation. Health must be guarded. Production and operation are seriously hampered if manpower is not kept in a healthy condition. Thirdly, I would list the factor of fire hazard. Here again we must recognize that our busy properties must be safeguarded against loss by fire; otherwise we will be greatly inconvenienced in our operation. The loss of a shop building today, with its equipment, will, perhaps, present a more serious situation than at any time in the past.

The War Production Board is asking that all but the most essential construction be abandoned or deferred.

*Mr. Wilbur, until recently field engineer in the building department of the Baltimore & Ohio, substituted on the program for A. L. Sparks, architect, Missouri-Kansas-Texas, St. Louis, Mo., who was unable to be present. In doing so, he included in his remarks, as presented here, considerable of the material which had been prepared by Mr. Sparks for presentation

I quote from its Bulletin No. 1788:

"Every builder is urged to ask himself several questions and to give careful consideration to his answers before filing applications for authorization to begin construction. He should ask himself whether his project is necessary to the successful execution of the war. He should ask whether it isn't practical to rent or convert instead of building new. He should ask if his design is the simplest possible, just sufficient to meet minimum requirements. He should ask if all utilities—water, electricity, gas, etc.—needed for his project, are available.

"The sole criterion is whether the project is necessary to the prosecution of the war, or to maintain the public health and safety."

Some Materials Essential

Owing to the heavy increase in railway traffic and the resulting increase in forces, some building rehabilitations, extensions and enlargements will be essential, even though not connected directly with war industries. This is true especially because the railways have just emerged from a long period of curtailment into an unprecedented rush of business, and are finding that many of their small buildings are entirely inadequate. In many cases there is need for larger yard offices, more toilet and locker facilities, and similar structures where temporary emergency quarters are not available. On some roads, the major part of the materials for such construction is often comprised of salvage obtained by dismantling structures no longer needed, or by reducing the size of buildings which are larger than necessary. But even with the maximum curtailment of construction and the use of all available salvage, there will still be a need for some new material for essential construction and maintenance.

Railway men can contribute most in the conservation of critical materials by salvaging and reclaiming critical materials in buildings or other structures where such materials are not being used for essential purposes, and also, in all types of construction, wherever it is possible, through the

substitution of non-critical materials.

Materials, including softwood lumber, the use of which is restricted, should be used sparingly, even though priority ratings are granted for their purchase. The sale of portland cement is restricted in some localities, but not in all. In fact, comparatively few items of construction materials are unrestricted to the extent that they may be purchased in the open market without priority assistance. Among these are brick, natural cement, plaster cement, lime, gypsum, plaster board (lathe), coal tar pitch, portland cement (in some localities), gypsum blocks, roll roofing, asphalt shingles, 4-in. and 6-in. vitrified tile, clay tile, glass blocks, sheet glass and paint.

In some cities, building codes regulating the use of materials, and methods of construction, reconstruction, alteration, maintenance and repair of buildings or other structures have been partially suspended for the duration of the war, thereby allowing the substitution of materials and methods heretofore barred. It is suggested, therefore, that railroad men keep themselves informed in this regard with the view to using simplified con-



Many Classes of Building Repairs Are Essential, and Can Be Carried Out Without Employing Critical Materials

struction on less important structures where more permanent construction would normally be required.

Second-Hand and Salvaged Materials

Liberal provision is allowed in the War Production Board's Conservation order for the use of second-hand materials where ownership is not changed, so that abnormally high dismantling and salvaging costs may be justified in order to retrieve these ma-

materials for essential construction. Heating equipment and plumbing fixtures and fittings are highly critical and difficult to procure with the usual priority assistance provided for railroads. Therefore, it is possible that many railroads could well afford to set up their own shops for overhauling and reconditioning discarded valves and plumbing fixtures.

Old Plumbing Fixtures

Almost every unused building contains old plumbing fixtures of some kind. In many instances these items would serve the needs of the railroads and the country to a far greater extent by being put back into service through the reclamation shop, rather than by going into the scrap bin.

Electric wire and lighting appurtenances are also highly critical and difficult to secure. Large quantities of salvaged wire are usually made available in the dismantling of old buildings—also considerable conduit. Porcelain outlet boxes can be used, thereby enabling the re-use of much of this material, even if in relatively short lengths. Plastic electric fixtures and fittings, in which very little metal is used, are also becoming available. On the other hand, large quantities of materials, for which priority assistance is provided under WPB Order L41, will continue to be available for repairing buildings.

Possible Substitutes Listed

With patriotic and conscientious watchfulness, every building construction and maintenance man can render valuable service to his country by substituting non-critical materials for critical materials or those otherwise restricted or difficult to secure. Following is a list of such possible substitutions:

- Gravity walls for reinforced concrete
- Thicker concrete floors with less reinforcing
- Brick walls for walls requiring hardware, metal lathe or lumber
- Concrete floors on solid fills, for floors normally supported by beams
- Wood trusses for steel
- Plywood girders for steel
- Laminated wood for heavy wood timbers
- Salvaged wood for new wood where possible
- Asbestos siding for drop siding and corrugated iron
- Asbestos shingles or asphalt shingles for steel roofing
- Bright roofing nails instead of galvanized roofing nails
- Wood for metal gutters and down spouts
- Composition flashings for metal
- Various types of wood doors for steel rolling and other metal doors
- Wood ventilators, monitors and skylights for metal

Brick chimneys instead of cast iron smoke stacks

Plaster or fibre board instead of wood for ceiling or wall sheathing

Brick, asbestos wall-board, fibre board or glass for steel toilet partitions and shower stalls

Masonry arches for steel or reinforced lintels

Wood, fibre board or composition lockers for steel lockers

Glass blocks and heavy wood sash for steel sash

Glass, porcelain and plastic lighting fixtures in lieu of fixtures of heavy metal

Scrap rail for trolley or monorail tracks in lieu of I-beams

Concrete and terra cotta pipe for metal pipe

Vitrified clay soil pipe instead of cast iron wherever possible

Wood or concrete manhole covers for cast iron. Wood where there is not much

traffic. Concrete where traffic must be considered

Wood or concrete wash troughs for cast iron

Cast iron stoves instead of boilers, radiators or unit heaters

Wood or asbestos smokejacks for metal

Wood tanks for steel

Second-hand wood stringers for reinforced concrete pit walls

Second-hand locomotive air cylinders for new hot water storage tanks

Reclaimed, rethreaded bolts and nuts

Short wood ties laid diagonally on engine pits in lieu of heavy timber

Wood fences for metal

Since all construction is definitely limited by the War Production Board's Conservation Order L41 and will be affected further, no doubt, by subsequent interpretations and revisions, it is vitally important that all building men keep themselves informed currently regarding these matters.

Train Kills Ten Trackmen

ON August 4, an eastbound passenger train on the Wabash struck and killed the foreman and nine laborers in an extra gang, near Truesdale, Mo. According to the report of the Bureau of Safety of the Interstate Commerce Commission, from which the following information is abstracted, this gang, which consisted of a foreman and 15 laborers, was engaged in surfacing track near the east end of a cut which is 25 ft. deep and 1,250 ft. long, and through which the track is on a 1-deg. curve.

Tamping Ties

At the time of the accident, which occurred at 1:17 p.m., the weather was cloudy. First No. 2, the train involved, was 39 min. late and was running at a speed of 67 m.p.h., according to the tape of the speed recorder with which the locomotive was equipped, the maximum authorized speed for this territory being 75 m.p.h. The 10 men who were killed were engaged in tamping inside the rails with pneumatic tie tampers, the compressor for their operation being set alongside the track 234 ft. to the west. The noise made by the tamping tools and the exhaust of the compressor combined to prevent the men from hearing the approach of the train.

The testimony presented at the investigation indicated that both engineers were maintaining a lookout, but that the view of the engineer was

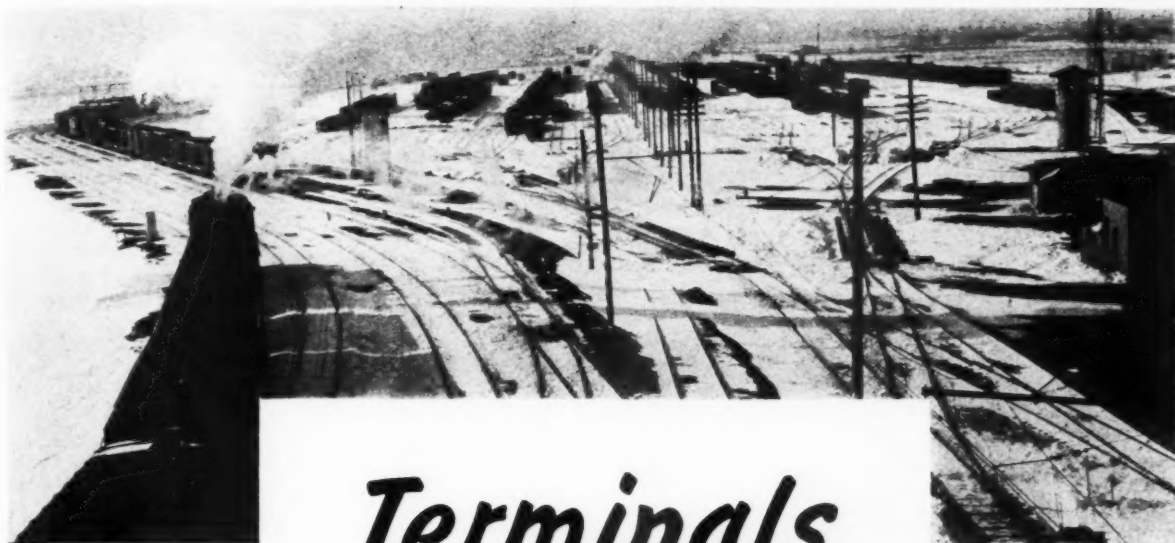
limited to a distance of 250 ft. because of the curvature. The fireman, being on the inside of the curve, first saw the men and called a warning to the engineer, but the distance was too short. The accident occurred before he was able to stop the train.

No Flag Protection

Also, according to the testimony, no warning (caution) signal had been placed to restrict the speed of trains over the track where the surfacing was in progress, and at the time of the accident the gang was working without flag protection. According to the statements of the six surviving members of the gang, it had been the practice to assign one man to act as lookout, to warn the men of approaching trains. Just prior to the accident, however, the foreman had assigned other duties to the member of the gang who had been on lookout duty, and he did not assign any other of the men to this duty.

The track supervisor testified that the foreman had been instructed to provide proper protection for his men while they were operating tamping tools. Why he failed to do so could not be ascertained, as, unfortunately, he was one of those killed in the accident.

The report added that "if protection had been provided for the crew involved, this accident could have been averted."



Terminals

Must Be Kept Open This Winter for War Traffic*

By G. P. Palmer,

Engineer Maintenance and Construction,
B. & O. C. T., Chicago



WE are now engaged in a war of greater proportions and more far-flung battles than this world has ever seen before. Because we are in such a war, we are facing many new and disturbing problems, not only as individuals, but as maintenance of way men as well. One of the difficult requirements that we must meet is that we maintain our tracks and structures to higher standards than ever before, to insure that there will be no delay in the movement of the arms and supplies that are so necessary to the men on the battle front. This requirement, in itself, might not be so difficult if it were not for the fact that these standards must be maintained in the face of ever increasing shortages of both men and materials.

But the maintenance of the tracks,

interlockings and other structures to these standards will not in itself insure against delays and interruption of traffic, for to do this they must, in addition, remain free of obstructions. In the months immediately ahead, snow is the most serious threat to the free movement of the amazing volume of traffic that the railways will be called upon to handle. While I do not belittle the difficulties encountered in keeping tracks open out on the line during heavy snows, I am sure that they are overshadowed, even in normal times, by the difficulties that beset those forces that must keep traffic moving through large terminals during similar storms.

Keeping our terminals open for a war-time traffic that must be kept moving regardless of all other considerations is a problem that both maintenance and operating officers are now facing with no little concern. Keeping a large terminal open when the country has not been at war has not always been an easy job, and now, in view of a shortage of labor which is already acute and which is becoming worse daily, we face what appears, on the surface at least, to be an impossible task in the event that we have a severe winter.

Obviously, we cannot foretell the kind of weather we will have during

the winter that is now opening. However, I remember the winter of 1917-1918, just a quarter-century ago, when we were in the midst of World War I, as we are now in the midst of a still more inclusive world war. It will be interesting, therefore, to make some brief comparisons between these two periods, so far as it is possible to do so, considering the factors of traffic, labor and weather.

Traffic Heavier Now

During the years 1917 and 1918 the traffic that we were handling was very much less than the traffic handled in 1942, and that we will be called upon to handle in 1943. Taking the winter months alone, from December 1, 1917, to March 31, 1918, revenue freight ton miles exceeded 111 billions. During the same months last winter we handled 173 billion ton-miles of freight, an increase of more than 55 per cent. At present, freight traffic has increased so much that we expect to handle more than 225 billion ton-miles of revenue freight from December to March, inclusive, this winter, an increase of slightly more than 102 per cent over what we handled during the same months of 1917-1918.

At the time of World War I, in

*Presented before a meeting of the Maintenance of Way Club of Chicago on November 23.

1917-1918, passenger traffic totalled more than 13 billion revenue miles. Last winter, this traffic was somewhat less than this figure, but at the present time revenue passenger miles are running more than 84 per cent ahead of a year ago. It is fair to assume, therefore, that we can expect an increase in revenue passenger miles, compared with 1917-1918, of at least 70 per cent. All of this increase is being handled with no appreciable increase in facilities, and with less cars and locomotives.

In general, the situation with respect to the labor available for emergency work is as bad as it was in 1917-1918, and in Chicago it is far more acute, for the reason that we have already called more men into the armed service and our war industry plants are now larger and more numerous than they were in the first World War. As the result, the supply of floating labor upon which we have heretofore depended for winter work is non-existent.

During January and February, 1918, Chicago experienced what was undoubtedly the worst winter weather since the Weather Bureau records for this area were first compiled in 1871. During that winter, the snowfall aggregated more than 60 in., of which 42½ in. fell during the early part of January. Again, during January the average temperature was 11½ deg., and during February, 26 deg., so that very little of this snow melted during these two months. Of course, we do not expect another winter like that. On the other hand, we have now had at least two years of mild winter weather and some real cold weather and snow should be about due.

Preparation Is Necessary

Such success as we who are in the maintenance of war department may have in carrying out our part of the job of keeping our terminals open this winter will depend in large measure upon how well we are prepared to fight the snow when it comes. If one is to be prepared as he should be to cope with snow and cold in a busy terminal, his preparations should start as soon as the stress of the previous winter is over, and he should be ready for any eventuality by November 1. It is true that we rarely encounter severe storms that early, but it is the unexpected events that cause most of our difficulties, because we are not ready for them. Unfortunately, at present, many of us have been so hard pressed to keep up with our regular maintenance tasks, partly because of an increase in the volume of work we are doing, partly because of the difficulty in obtaining the materials we need,

and partly because of the labor shortage that has been developing since early in the year, that we may not be as well prepared for what lies ahead of us as we would like to be.

To make a comparison in keeping with the times, the maintenance of way department can be likened to the army organization, in which the division engineer is the colonel, the supervisors are the captains and the foremen are the lieutenants. Still following the simile, there are two main areas of defense against the attack of the elements. One is in our terminals and the other is out on the line. We will limit our discussion to the terminals where we have to defend or protect (1) engine terminals, (2) interlockings, (3) coach yards, (4) passenger terminals and stations, (5) freight yards and (6) industrial districts, in this order of importance.

Interlockings Vulnerable

We must be sure that at engine terminals our turntables, cinder-handling equipment and coal docks are in good operating condition, with all machinery properly lubricated, and that winter oil has been provided. Water lines and water columns should be protected against freezing; catch basins, sewers and other drainage lines should be clean and free of obstructions; and steam lines should be protected and free from leaks. Most of this work should be done well in advance of winter to insure against possible failures that might in the end cause serious delay to the movement of trains. These requirements apply with equal force to facilities for handling both steam and Diesel power and equipment.

Interlocking plants are particularly vulnerable in case of snowfall, especially if it is heavy and is accompanied by wind so that the snow tends to drift. Interlockings become points of urgent concern in a large terminal area like Chicago, where so many railways cross each other like the lines of a spider web. Not only for this reason, but because many of them operate complicated track layouts and control numerous train routings, the job of keeping interlockings clear of snow and ice becomes one of the main problems of snow fighting and snow disposal in a busy terminal. Therefore, a part of our regular trained force should be assigned to each interlocking. The use of snow-melting torches and switch heaters for melting snow at interlockings, and at many other points as well, is of material assistance, especially where labor is scarce.

When an interlocking is tied up, whether it results from lack of force

or by reason of the severity of the storm, the whole movement of traffic is interrupted until the plant can be opened again. Modern devices, such as oil-burning switch heaters, gas and electric switch heaters, and hydrocarbon melting cans reduce the amount of labor required to keep interlockings open. This is true particularly of the gas and electric heaters which require a minimum of attendance, and to a somewhat less extent of the oil-burning pots.

Coach yards create other problems, particularly with respect to drainage, which tends to accumulate during long cold spells, and freeze, such as that which occurred in 1936, when we had 25 consecutive days of weather below freezing, with long-continued temperatures below zero. At passenger terminals we have the further problem of keeping outside platforms, stairways and other passenger facilities free from ice to prevent injuries to our patrons. In many cases, too, it is almost as much of a problem to keep baggage and mail facilities open as it is those for the handling of passengers.

Biggest Job—Freight Facilities

In a large terminal, the biggest job, however, is to keep freight facilities clear of snow and ice. One of the important tasks is to keep the leads in switching yards clear, and this is particularly true when the switching is done over a hump, in which case the car retarders become an added problem. At many points switch heaters can be used to advantage, not only at the entrance to a freight yard, but also at any point where the switches are interlocked. Weed burners and tractors equipped with bulldozers or angle dozers have been singularly effective under certain conditions.

If there are accumulations of weeds and dirt or trash along ladder tracks, they should be removed well before winter, and all interlocking pipe lines should be cleaned similarly, to eliminate any form of obstruction that might tend to catch or hold snow, as well as to provide room for disposing of snow from the track without causing a blockade. The handling of snow and ice is a large subject in itself, which will not be discussed here since it was covered so thoroughly in a report to the fifty-fifth annual meeting of the Roadmasters' Association in 1940, and appears in the Proceedings for that year.

There are many industrial areas served by the belt lines of Chicago, and many others served by the trunk lines entering the city, in which, at present, there are important war industries that are creating problems that are somewhat different from

those we meet at other points or in normal times. In most cases, the industries are responsible for the maintenance of the tracks, but during bad weather many of them fail to keep their tracks clean. This winter, the railways will not have sufficient forces to do this for them and at the same time keep their own tracks open.

Uses Snow Blowers

In working out this problem we have found that we can place a device on the front of switch engines with which live steam can be used to blow on the track head of the engine to clean the snow away. We call them "snow blowers," and when it is not too cold we are able to keep industrial switches and leads clear by putting one man on each engine equipped with this device. Their effectiveness is limited, however, to storms that are not accompanied by heavy snow, of which we have many more than we do of severe blizzards.

Mention has been made of the use of torches, switch heaters and snow blowers. While these are very helpful and important in our battle against the elements, we must also be equipped with snow brooms, shovels, ice picks and other hand tools for fighting both snow and ice, as well as salt or other chemicals to act as a melting agent. These tools and materials should be distributed at key points prior to winter and should be kept for emergency use only. In addition, there should be an ample reserve which can be drawn on in case of need. In many instances snow fences will be of considerable aid, particularly in exposed places where the wind gets an unbroken sweep for some distance, and these fences should be erected wherever they will be of benefit.

If we are experienced in the area in which we are now located, we know where the weak and the difficult places are, and we should assign key men to protect them. The use of the telephone is vital during heavy storms to keep headquarters informed as to the situation and its requirements. Contact should be maintained with the chief dispatcher, with yardmasters, and with each interlocking, to insure immediate notice of any change in the situation at any point in the area. Where it is possible to do so, a reserve force should be maintained, which can be moved quickly to any point where a sudden emergency may develop.

During previous winters we have been able to obtain the official weather maps daily, and from them we were able to forecast the weather with a reasonable degree of accuracy for two or three days in advance, and some-

times for longer periods. At my office we also keep a barometer and an outside thermometer. The present reticence of the weather bureau about forecasting what the weather is likely to be more than a few hours in advance will be a severe handicap during the coming winter. However, while we are not now able to get the weather maps, arrangements can and should be made with the weather bureau to supply advance data regarding storms and cold waves to a specially assigned key man on each road, who will transmit it only to those who

Switch Heaters Will Play a Large Part in Snow Fighting This Winter, but a Certain Minimum of Manpower Is Indispensable.



must know it to permit them to plan intelligently. Such an arrangement to provide a warning will be of great value in keeping the terminal clear and open for train movements.

Labor Situation Critical

Our biggest problem this winter is going to be the labor situation. In the past, we have been able to obtain emergency forces during stormy weather, drawing largely from unemployed itinerant labor. I doubt whether such forces will be available in sufficient volume this winter to be of any considerable benefit. If not, we must depend on our regular force, supplemented by labor-saving devices to a larger extent than ever before. Snow storms that do not last longer than 24 hours can probably be handled by keeping a large part of the men on duty during the emergency. If we get a blizzard that continues for 36 to 48 hours or longer, as sometimes happens, I dread to think of what is going to happen to our traffic if nothing is done to protect the railways from the labor standpoint, such as the freezing of maintenance of way labor, or the importation of labor by the government, as was done in 1917 and 1918.

I well remember that in 1918, when practically all traffic was stopped by the snow blockade, the industries supplied men from their plants to assist us in removing snow from our own tracks, to get the railway back into

operation. They did this voluntarily, because their own businesses could not go on until railway traffic began to move and cars could be delivered and received at their plants. We cannot expect and should not call for this help unless conditions become so bad that we are unable to work our way out with our own forces.

While the picture I have painted appears to be rather gloomy, especially from a labor standpoint, I still believe in the old adage that where there's a will there's a way, and I believe quite certainly that the maintenance of way

organizations of the railways will find a way to keep their terminals open.

Summarizing the situation we face, each supervisory officer should study his own problem, doing as much as he can ahead of time. He should watch key points, remembering that engine terminals are among the most important of these, for if locomotives cannot be gotten out and made available, it is useless to expend much energy to keep the line open elsewhere. He should get as much advance information as possible on what he will have to contend with in the way of storms and their severity. It will be a continuous fight, from the first storm of the winter to the end of the season, and the better he is prepared at the start, the better his record will be at the end.

We should not allow snow to accumulate in the early part of the winter, because of the danger of blockades later. In the disposal of snow after a storm has passed, weed burners, clamshells, power shovels, Jordan spreaders and tractors with bulldozers, rotary snow brooms and front-end loaders, all have an important place, as some of them do while the storm is at its height.

We must remember that traffic must be kept moving regardless of all other considerations, so that our armed forces will be supplied with every item they need to win this war as soon as possible. We have a tough job before us, but I believe that we are going to do the job and do it right.



WHAT'S the Answer?

How Much Emergency Rail?

In view of the present shortage of both new and released rail, to what extent can a reduction be made in the rails held for emergency use out on the line?

Can Make Some Reduction

By BERNARD BLUM
Chief Engineer, Northern Pacific, St. Paul, Minn.

This question differentiates between emergency rail held on the line and that held as emergency stock in rail yards. In view of the present shortage of rail, we have been discussing the advisability of changing our practice with respect to new 112 and 131-lb. rail on rail rests at mile posts. In view of the controlled cooling of our 112 and 131-lb. rails, with consequent freedom from transverse-fissure failure hazards, it is believed that we will be justified in holding such repair rail at section headquarters and in making a substantial reduction in the number of such rails held for emergency. It is estimated that by doing this we will make available about two track miles of rail for increasing our rail renewal program.

It is not considered that the same reduction can be made in our emergency stock of second-hand main-track repair rail, for the reason that, based on our experience, we retain, both in the rail yard and out on the line on rail rests, a certain number of repair rails, which are selected each year from the rail released when laying new rail. Reducing the number of these second-hand rails held on the line for emergency use will not affect the total number held in stock for such repair purposes. It is considered to be of some advantage to have such rails readily available along the line for immediate repair work, especially in view of our prac-

tice of testing main-line track approximately every six months by detector cars and of replacing immediately any fissured rail that is found.

Also it was our practice for some time to set aside each year 10 miles of new rail for emergency requirements such as rails badly nicked by broken wheels or from other causes. Recently we reduced this emergency stock to five miles.

Requirements Have Changed

By W. H. SPARKS
General Inspector of Track, Chesapeake & Ohio, Russell, Ky.

Formerly, it was almost a necessity to hold a relatively large stock of emergency rails on hand, on rail rests at mile posts and in piles at other points, and some roads are still following this practice. However, many roads are now placing their emergency rails at tool houses or some other convenient point where they can be gotten out quickly when needed. Personally, I prefer the tool house as the place for the emergency rails, where they are open to observation and where they can be changed easily from time to time to keep on hand rails that are worn in

To Be Answered in February

1. What measures to prevent personal injuries to trackmen should be taken now that are not considered necessary normally? Why? Who should be responsible?

2. What is the effect of reduced tin content in solder? What special methods must be employed in applying low-tin solders? Does this differ for different applications?

3. Are there any advantages in installing rail and flange lubricators on ladder tracks as a measure to conserve rail? Any disadvantage? Where should they be placed?

4. What substitutes can be used for metal and reinforced concrete cribbing units for retaining walls? What is the relative life? The advantages? The disadvantages?

5. For what kinds of work can women be employed in the maintenance of way department to offset the present labor shortage? To what extent?

6. To what extent can the use of critical materials in water service be avoided by welding?

7. In view of the present shortage of man-power, what practical methods can be employed to provide capable operators for power machines? What means can be employed to instruct them in their duties?

8. Is it desirable to supplement the regular fire-fighting equipment in buildings during the war period? Why? If so, in what way? Who should be responsible?

Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.

conformity with those in the track.

When we changed from the mile posts to the tool houses, we found that we could reduce the number of emergency rails we had thought it

necessary to keep on hand. Now that controlled cooling has practically eliminated transverse fissures, rail failures are fewer and there is not the same need for emergency rails as there has been until recently, on lines laid with 112 and 131-lb. rail. If, therefore, more than two or three heavy-section rails are being held on individual sections for emergency use, I believe that for ordinary traffic density it will be safe to reduce the stock to this number, although a high density of traffic may make a larger stock advisable.

If the rail is of less than 112 lb. section, the number of emergency rails will need to be greater, for this rail was probably cooled on the hot bed and may contain internal fissures. Only those officers who have maintained this rail are in position to judge the size of the emergency stock that should be maintained.

Conditions Differ Widely

By G. L. SITTON

Chief Engineer Maintenance of Way and Structures, Eastern Lines, Southern, Charlotte, N.C.

It goes without question that this subject should be given careful considerations with the view of minimizing the stock of rail not in use as much as practicable. Yet, conditions differ so widely, even on different lines of the same road, that no rule can be made that will set forth what is a satisfactory minimum stock of such rail. Some of the things to be considered in arriving at a decision on this point will be discussed.

Where detector cars are used regularly, it is possible to reduce the stock of patch rails, because few broken rails may be expected between trips of the detector car. Some rails, however, are likely to fail between these tests, especially near the joints. This is especially true of certain stretches of track, in which cases, records prior to the use of the detector car have indicated to the supervisor and roadmaster the likelihood of more failures than at other points, and this information is helpful in deciding where to hold patch rails.

Consideration should also be given to whether the rail in track is controlled cooled, as it is safe to assume that there will be almost no failures in such rails unless they are damaged in some way, such as by slipping drivers. Where one track is laid with 33-ft. rails and the other with 39-ft. rails, it will be necessary to provide rails of both lengths for

patch purposes, and this tends to increase somewhat the size of the minimum satisfactory stock.

There is always danger that rails will be damaged by broken wheels or by derailments. Broken wheels have been known to damage several miles of rail, but damage from this source occurs infrequently and, under existing conditions, it is not practicable to carry a stock of rail for the purpose of replacing so much damaged rail. Obviously, there should be a few extra rails at supervisors' headquarters and at division headquarters, while wrecking derricks should

be kept supplied with a stock of patch rails.

Where the line carries medium or light traffic, one or two, or possibly three, rails at each tool house are generally sufficient, but where traffic is quite heavy, and unless the rail is controlled cooled, one rail for each one or two track miles is not too much, especially considering that rail which is distributed at close intervals can be gotten into place much more quickly than rail that must be hauled a considerable distance, especially when trains are being held up by the broken rail.

Using Second-Hand Materials

Since severe restrictions are being placed on some classes of building materials, to what extent can second-hand materials be used for building maintenance? Where can these materials be obtained?

From Many Sources

By A. T. HAWK

Engineer Architect, Chicago, Rock Island & Pacific, Chicago

Second-hand materials can be secured in a wide variety of ways and should be used as extensively as possible. Some of these sources and applications will be discussed. Usable second-hand materials can almost invariably be recovered from buildings and other structures which are no longer needed by reason of the rapidly changing requirements of traffic and operation. Many stations, freight houses and similar buildings are today entirely too large for the volume of business passing through them. They can be reduced in size and the materials that can be salvaged can be used to repair or restore the remainder of the structure, thus reducing for a considerable period the need for any heavy maintenance expense. The smaller reconditioned building will also tend to reduce the cost of heating, lighting, fire insurance and, probably, taxes.

With the advent of long engine runs, many engine terminals were abandoned or virtually abandoned, and in some cases all of the shop facilities can be or may have been eliminated. If this is done now it will provide a large amount of salvage, much of which can be used to supplement the rapidly diminishing stock of new materials, carried by the storehouse, provided the structures are razed carefully and the reclaimable materials are sent to a well-organized reclamation shop.

The removal of these structures will also release considerable scrap metal.

Much usable material can be obtained from structures on abandoned lines, some of which can be reserved for use in bridge maintenance without reconditioning. Other material can be reclaimed in the wood shop and used in both maintenance and new work. Short piling can be ripped to form suitable posts for stock yards; stringers can be reworked into lumber of many different dimensions that may be far better than the low-stress material that we are able to purchase today. Lumber that is reclaimed from originally dense high-stress material will still be excellent for both maintenance and new work.

The Rock Island is now completing a reclamation shop 43 ft. by 300 ft. that, except for the concrete foundation and floor, is being built almost entirely with reclaimed materials. One section of this building, 120 ft. long, was a machine shop that has been taken down at an abandoned coal mine and re-erected as a part of the new facility, including an overhead 5-ton electric crane. The steel frame for the remainder of the building was fabricated from steel angles and plates recovered from the dismantling of condemned freight cars. The steel roof trusses, the purlins and the roof bracing of this part of the shop came from this reclaimed stock, while the rafters are from second-hand resawed lumber. Steel salvaged from obsolete cars, and from bridges on abandoned lines, can be utilized in the construction of shops and other necessary buildings

and the use of critical materials can be almost entirely eliminated through the installation of concrete floors, brick or tile walls, rafters and roof boards of sawed second-hand lumber and prepared or built-up roofing; or the side walls and roof can be covered with asbestos siding and shingles.

The depression years have taught us to check our potential sources of materials by searching our own properties. Previously we made it a practice to dispose of our surplus buildings to wrecking concerns, sometimes for a small amount, allowing the contractor to retain the salvage. We now find this salvage a real benefit in providing us with materials that we are unable to get in any other way.

Has Many Uses

By WILLIAM A. MEISSNER
Assistant Engineer, Lehigh Valley,
Wilkes-Barre, Pa.

Second-hand material can be used in a surprising variety of ways for the maintenance of present structures. The dismantling of many large buildings has yielded a varied assortment of lumber and equipment, while stone buildings erected 60 or more years ago have provided us with excellent material for the construction of walls, for rip rap to protect embankments and bridge piers and for filling. Heating equipment finds many uses in smaller buildings where the load is smaller than that for which it was designed and where its new duties are commensurate with its reduced capacity from age and use. Partitions, trim and mill work can be used to advantage in the construction of small buildings, such as tool houses, guard houses, out buildings, sheds, coal boxes, stock yards, storage bins and structures of like character. In some instances partitions or other parts of buildings can be removed in sections and re-erected at small labor cost.

Large buildings will usually yield considerable sound timber of large dimensions, some of which can be given preservative treatment and used to advantage in repairing other buildings, barges, docks and wharves; or it may be sawed into smaller sizes. In removing clapboards and siding, extreme care should be exercised to avoid breakage, and in the sorting to avoid unnecessary handling. There is an insistent demand for this material, both for maintenance and in the construction of small buildings.

Roofing can be removed in sheets

which can be trimmed to a uniform size, that, when reapplied, will present an appearance equal to that of new material. Box cars in which war materials have been shipped sometimes yield the smaller sizes of lumber, which is usually wasted

when the cars are cleaned, but which can be used for many purposes. Such cars may also contain discarded metal sheets that can be straightened and used to make stove pipes, gutters, ventilators, etc., provided care is exercised in salvaging them.

Returning Usable Materials

To what extent should maintenance forces return usable materials to the stores department for reissue rather than hold them for local use? Does the kind or amount make any difference? What other considerations are involved?

Avoid Local Stocks

By H. F. FIFIELD
Engineer Maintenance of Way, Boston &
Maine, Boston, Mass.

In general, all materials released on a division should be returned to the stores department for reissue. It is the practice on this road, however, to assign certain materials, such as those released on new rail programs, to the location where the released rail is to be used in connection with the rail relaying program. It is also the practice to assign the released tie plates direct to the division rather than to return them to the stores department. It is good practice, however, to forward all other material to the stores department and thereby avoid the accumulation of stocks at various points on the road.

All Should Be Shipped

By C. M. CHUMLEY
Engineer Maintenance of Way, Illinois
Central, Chicago

All usable materials made available on a division or a district should be shipped to the storehouse promptly, unless, in the judgment of the maintenance engineer, the district upon which the material has been released will have immediate need for it, or, if it is needed immediately upon some other district, shipment should be made direct, thus saving time and the cost of extra handling. If the material is bulky, such as plate-girder spans, it may be advisable to store it near the site of its release, to save storage space and extra handling at the storehouse. However, if the material is not bulky and is in comparatively small quantities, it should be shipped directly to the storehouse, thereby enabling the stores department to reissue it to districts that can use it, thus keeping

stocks low and, in many cases, avoiding purchases of critical materials.

Another consideration that should not be ignored is the cost of collecting and assembling the materials for shipment to the storehouse. If this is done in a systematic manner, the cost of collecting the materials promptly should not be materially greater than that of the usual method of collecting from day to day at convenient times.

Do Not Denude District

By W. H. SPARKS
General Inspector of Track, Chesapeake
& Ohio, Russell, Ky.

Both supervisors and foremen differ widely in their attitudes concerning the retention of materials. One will essay to keep everything, except scrap, that has come into his possession, while another will ship everything that is left over when a job is completed, both new and released items. Still another will hold out a few items on the theory that it is a good idea to have a small stock handy, which can be drawn on immediately in case of need. Basically, this idea is right, but I would not allow such a stock to be held on every section, for this would be a waste of material, and experience has shown that where this is done some of the items will become obsolete before they are used and that others will become lost, in both of which events the railway will sustain a loss without having attained any commensurate advantage.

Obviously, a small stock of emergency materials should be kept on hand at each district or division headquarters, including frogs, switches, switch stands, spikes, bolts and other accessories, and certain water-service and bridge and buildings materials. While I recognize the need for having these essential

materials on hand, I am also aware that there are several drawbacks to doing so. In the first place, under ordinary conditions emergency materials are seldom used. There is danger, therefore, that they may become obsolete or be ruined through corrosion, unless they are rotated, that is, used and replaced with new materials at intervals. Another drawback is that emergency stocks are sometimes not looked after as they should be or they are forgotten and become lost until some clean-up campaign, such as the scrap drives that are now so popular, brings them to light, perhaps considerably deteriorated. More than one road has recently found numerous items of this kind that had to be turned in as scrap or whose potential service life was greatly curtailed.

On the other hand, the emergency stock should never contain any surplus above actual needs. Even the

most necessary stocks represent an astonishingly large investment, and anything above actual needs is sheer waste of money and good material. Whenever usable materials are released or when a job is completed and new materials are left over, they should be shipped to the store house at once, unless they are needed elsewhere and can be used immediately. The need for doing this is more obvious at the moment, for it may avoid the purchase of critical materials. The principle remains the same, however, whether it is to help in the war effort or to economize and thus help one's own road in times of peace. It is an ideal situation when there is no material left over upon the completion of a job, so that there will be nothing to pick up and ship back, no reloading for redistribution, no cars held in non-revenue (company-material) service and no unproductive cost of handling.

Faster Delivery of Water

Where increases in density or speed of traffic demand faster delivery of water to locomotives, how can this be accomplished without installing larger water columns.

Increase Head or Pipe

By J. H. DAVIDSON

Water Engineer, Missouri-Kansas-Texas, Parsons, Kan.

Pipe friction and flow head are the two important factors that govern the flow of water through mains. If it is desired, therefore, to increase the delivery of water through a water column without increasing the size of the column, it will be necessary either to decrease the pipe friction or increase the flow head. While different water columns of the same size will deliver varying quantities of water under the same flow head and delivery-main conditions, the following examples will illustrate what changes in delivery capacity may be expected with one type of column under varying flow heads and with different sizes of mains:

This 10-in. column will deliver 1,340 g.p.m. through 1,000 ft. of 10-in. main, with a flow head of 20 ft. If the main is 12 in., and the length and head are the same as before, the column will deliver 1,925 gal., while a 14-in. main will increase the delivery to 2,530 g.p.m. Another method is to increase the flow head, while holding the main and column the same. With the 20-ft. head the flow will be 1,340 g.p.m. but under

a 40-ft. head the flow will be 1,910 gal. If the main supplying the column is long, friction losses become a very important factor, and greater delivery can be secured by locating the column closer to the tank or other source of supply.

Obviously the flow can be increased by increasing the height of the tank from which the water is supplied, but usually this method is too expensive or is not practical because of local conditions. However, the flow head or pressure in the main supplying the column can be increased by installing a booster pump, electrically driven and controlled automatically, so that it will operate only while water is being taken. The determination as to which of these methods should be used will, of course, depend on local conditions and on what materials and equipment are available.

Increase the Head

By E. M. GRIME

Engineer of Water Service, Northern Pacific, St. Paul, Minn.

When greater delivery through a water column is required, the remedy does not lie so much in enlarging the size of the column as in increasing

the available head of the water. With 1,000 ft. of 10-in. pipe, a head of 20 ft. will give a delivery of 1,325 g.p.m. through a certain design of 10-in. column, and of 1,375 g.p.m. through a 12-in. column, an increase of 50 gal. or 4 per cent. If the friction is reduced by means of a larger main, say 12 in., the head is increased sufficiently to deliver 1,950 g.p.m. through the 10-in. column, an increase of 625 gal., or 47 per cent. It will cost a comparatively small additional amount to enlarge the main to 14 in. but this will give a delivery of 2,450 g.p.m., an increase of 91 per cent.

With the present urgent demand for greater speed, it is becoming increasingly important to reduce the time required to take water. Whenever a storage tank is to be rebuilt it is desirable, therefore, to study the location to determine whether it is possible to place the tank closer to the point where the water is to be delivered to locomotives, and at the same time plan to provide a column of ample size, preferably 12 in.

Where it is impracticable to enlarge the supply main or to improve the location of the storage tank, the addition of a smaller storage tank close to the water column may be the least costly method of increasing the flow. By keeping this tank filled continuously by regular flow through a main that is smaller than it should be, maximum flow may be provided for each locomotive served unless the trains are bunched closely. This tank also has value because it increases the total storage available.

Columns Seldom Limit

By J. P. HANLEY

Water Service Inspector, Illinois Central, Chicago

Recently, a decided trend to larger engine tenders and faster freight trains, together with increased traffic generally, has created a problem with respect to providing sufficiently fast delivery of water to present designs of locomotive tanks to insure against train delays. This makes it necessary to provide a flow of not less than 4,000 g.p.m. to supply tenders having capacities of 20,000 to 25,000 gal. In many cases existing deliveries do not exceed 2,000 g.p.m., and some are materially less, a rate that was considered adequate when tenders had one-half, or less, the capacity of modern equipment.

In increasing the delivery at the older stations, the size of the water column itself is not generally the limiting factor, since most railways

were already using 12-in. water columns on their main lines before the large tenders came into use. A 12-in. water column will readily deliver 4,000 and even 5,000 g.p.m. if the water is available at the column inlet. The limiting factor must, therefore, be sought beyond this point, and is found to be lack of head or friction losses. These defects may be overcome (1) by raising the tank tower; (2) by cleaning the delivery main of incrustation or other obstructions; (3) by placing a smaller tank near the water column, if the supply main is too small or too long; (4) by laying an additional main, connected to the existing main at both ends; and (5) by increasing

the size of the water column, if it is less than 12 in. The use of a booster pump is sometimes advocated, but is not generally favored, except where clearances do not permit overhead storage tanks or the other expedients that have been mentioned.

If a new water station is involved, the use of 12-in. water columns, with 14 or 16-in. supply lines should be considered. The column should be located near the roadside tank, if practicable, to shorten the supply main. If this cannot be done because the tank is already in place, an additional tank of smaller size should be installed. Such a tank is often less costly than a long run of large pipe for the supply main.

Better Utilization of Ties

If the present shortage of ties increases, what measures can be taken to utilize those available to the best advantage?

Economics Are Secondary

By W. J. BURTON

Assistant to Chief Engineer, Missouri Pacific, St. Louis, Mo.

Most of the ties now in service are creosoted. With such ties, failure is brought about largely by mechanical destruction, and most of this varies with the volume of traffic. Mere lapse of time has only a minor effect on tie life. This means that if present ton miles are approaching double what they were in 1940, ties are being worn out nearly twice as fast. Ties will, therefore, become due for renewal this year and next, that would have remained in service for at least a year or two longer, if the great increase in traffic had not occurred. There is, however, a factor tending in the other direction. This is the reduced rail renewals imposed by the rationing of steel, for whenever rail is relaid there is, unavoidably, considerable tie destruction and loss of tie life.

It seems evident that, in addition to such action as will remove any unnecessary restrictions on tie production, action that will reduce new-tie requirements is highly desirable. Unfortunately, there is not much that can be done in this direction. Well-managed railways, and this includes practically all, long ago adopted practices calculated to get the most out of their ties. The drop from more than 100,000,000 ties renewed annually to less than 50,000,000 per year for the United States, and this

despite the higher track standards necessitated by heavier power and higher speeds, is evidence of the success of present tie economy measures.

One possible modification of what is good practice in ordinary times will be a move in the right direction, although, in itself, quite insufficient to overcome the prospective tie shortage. It is good practice when track is being surfaced out of face, as in connection with rail renewals or ballast strengthening, to renew not only those ties that have failed, but also those that are about to fail, or which will not last one or two years longer. This practice is fully justified from the economic standpoint, and increasing labor costs have made it more and more so. But under war conditions economics must be strictly secondary. Even though the cost will be greater in the long run, and more labor will be necessary to maintain line and surface, this practice of taking out any but actually failed ties should be discontinued.

In connection with this practice, it is usual to require that any ties that have been removed from main tracks, but which are good for further service in sidings, be reused in such tracks. Where side tracks are near by, such re-insertion has been carried out much more consistently than where reuse has involved moving the ties for some distance. Again, economics must be secondary.

It is now more than ever necessary to carry out these details of standard

good practice which prolong tie life. Cutting and adzing should be limited to what is necessary to obtain proper bearing, and cut surfaces should be painted promptly with creosote, preferably hot. Creosoted tie plugs should invariably be driven whenever spikes are pulled. Tie edges damaged by dragging equipment should be trimmed and creosote should be applied. Mauls and sharp-pointed tools should not be used on ties. Rail should be anchored sufficiently to prevent creepage, with resulting tie damage. Hot cinders should not be allowed to burn ties in the track.

Although the supply of new ties may be restricted, there is no reason why standard good practice should not be followed in tie procurement. There should not, and there need not, be any let-up in adherence to standard specifications for ties, or in caring for them before, during and after treatment, particularly ties that are to be used in permanent tracks.

Limit to Spot Renewals

By JULIUS M. BISCHOFF

Office Engineer, Terminal Railroad Association, St. Louis, Mo.

If the present shortage of ties increases, the practice of renewing ties out of face should be abandoned and renewals limited to spotting. Only completely worn-out ties should be replaced. Moreover, where a number of almost-worn-out ties are grouped, only every alternate, or even every third tie should be replaced. Only enough ties should be replaced to keep the track safe and high maintenance standards should be replaced by safe maintenance standards. Engine crews should be instructed to avoid burning ties when cleaning locomotive fires and dumping cinders. While such destruction of ties is reprehensible at any time, it cannot be tolerated during a tie shortage. If for any reason ties that have some remaining life are removed, they should be reused as soon as possible in yard tracks.

Learned During Depression

By C. D. TURLEY

Chief Tie Inspector, Illinois Central, Chicago

If the present abnormal demand for crossties continues, the existing shortage will increase and we will be faced with the problem of maintaining safe track with a reduction in the number of crosstie renewals. Past

experience has taught that this can be done for a limited number of years by following the general practices that will be mentioned. More ties are required where track is surfaced out of face; therefore, out-of-face work should be avoided where it is otherwise economical or advisable to do so. When track is surfaced out of face, no ties should be removed, which, in the judgment of the foreman, contain enough additional life to offset the extra labor cost of removing them later.

Where out-of-face surfacing is not

necessary, ties should be spotted in, in accordance with the following rules:

(a) no tie containing one additional year of life should be removed; (b) spot one good tie between two defective ones; (c) where ties hold surface, but do not hold gage, spot in enough ties to make the track safe; (d) give joint ties preference; (e) keep tie conditions as uniform as possible on all districts, taking into consideration the amount and kind of traffic and the equipment in use.

hand in the United States had been impounded for the use of the navy. With the sudden expansion in ships that has followed the opening of the war, the stock of manila fibres has been depleted. Fearing its exhaustion in the near future, all stocks of sisal and hemp rope and fibres have also been frozen, and none are now available for civilian use. It is obvious, therefore, that it has become urgently necessary to conserve every item of cordage in service, and to protect it in every way possible. So serious is the situation that the government is giving serious consideration to the planting of a large acreage in hemp to obtain quickly a supply of cordage fibres.

We use wire rope in cranes and elsewhere where heavy loads must be handled. In ordinary bridge and building operations little wire rope is used, since cordage is so much more suitable for scaffolds, for hand hoisting, for block and tackle and for the hundred and one other uses to which lines are put. In our survey we found that this line of demarcation between wire rope and cordage seems to be perfectly logical, both under normal conditions and in the present emergency. However, it is obvious that under present circumstances we will be compelled to use what we can get.

Cordage and Wire Rope

To what extent and for what purposes can cordage be substituted for wire rope in bridge and building operations?

Uses Little Wire Rope

By L. G. BYRD

Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

I well remember that when I started in railway work, wire rope was not often used for normal bridge and building operations. In the old days hammers or pile drivers were raised with manila rope or other cordage, while the same kind of rope was used for the pile line. Drop hammers are seldom used today, however, especially on heavy construction or extensive maintenance projects. Today, wire rope is used with steam hammers, on cranes and on other equipment where heavy loads must be handled. In many cases the capacity of the equipment is greater than that of any cordage that could be used conveniently with the equipment. Again, to use cordage on these machines it would be necessary to change the sheaves on them.

As a rule, division bridge and building gangs are very seldom required to use wire rope in their work, except on hand winches, pile drivers and derricks. In view of the difficulty of obtaining wire rope, we have discontinued ordering it for hand winches and, since the problem of obtaining wire rope will be even more difficult from this time on, we are considering the use of other material.

Both Are Scarce

By GENERAL INSPECTOR OF BRIDGES

At the time this question was published, we foresaw so much difficulty in obtaining enough wire rope for all

of our future requirements that we were already making a canvass to determine where and for what purposes we could substitute cordage for wire rope. That, of course, meant sisal or hemp rope, for manila fibres were shut off with the opening of hostilities in the Pacific, and all of this material on

Individual Tie Tampers

With the growing scarcity of labor, to what extent is it advisable to provide section gangs with individual tie tampers? How many? What are the advantages? The disadvantages?

Is A Step Forward

By C. S. KIRKPATRICK

Chief Engineer, Missouri Pacific Lines, Houston, Tex.

It is my experience that when a section gang consists of a foreman and three men, two individual tie tampers can be used, but greater efficiency can be secured by a gang of four men and a foreman. If kept running, these individual tie tampers will keep such a gang busy continuously. That is one of the fine things about an individual tamper. As one roadmaster expressed it, "these individual tie tampers sure put some of the old boys to work." We found that in a gang of one foreman and seven men, four individual tie tampers can be used to advantage. This device is also excellent for small gangs in rock ballast; in fact, the greatest return from their use is in rock ballasted track.

The individual tie tamper is a step forward. It is a tool to do one of the most important parts of the work, but judgment is necessary with respect to how and where these tampers should be used. The kind of ballast has a lot to do with their efficiency. They are great labor savers for a small gang around switches and frogs, and at highway crossings. Whether the ballast is gravel or some other material, the individual tie tamper is not only a handy tool, but it has become a necessity for small section gangs.

Effective in Stone

By W. L. ROLLER

Division Engineer, Chesapeake & Ohio, Columbus, Ohio

The advisability of providing individual tie tampers is contingent on the local conditions where they are

to be used, and the following questions must be considered:

Is the ballast of proper type and quality to require machine tamping?

Should the track in question be surfaced out of face or be only spot tamped?

Do you have men of sufficient mechanical skill to operate and maintain tools of this kind?

Is the scarcity of labor sufficient or the need of improved maintenance of tracks acute enough to justify the investment?

Discussing these conditions individually, it is my belief that individual machine tamperers are not advisable in gravel or cinder ballast, but that they are desirable and effective in crushed stone and slag. Tamping tracks out of face can be done most effectively by a gang of sufficient size to require a larger tamping outfit, although, obviously, in such a case, a sufficient number of individual tamperers might be assembled for the job. If the tracks are in need of spot tamping to smooth the joints, individual tamperers suitable for a small section force of two or three men are most appropriate. Such an outfit could, no doubt, serve two sections alternately, depending on the density of traffic and the mileage allocated to them.

Probably the most important factor to be considered is the adaptability of the foremen and men in handling and operating mechanical devices. Some

preparatory instruction should be given the men who are to be responsible for the care and operation of these machines and some expert supervision should be added where any increase in mechanical equipment of this kind is contemplated. This supervision should be made responsible for the instruction of the men in the use of the machines as well as current repairs incident to their operation.

The number of units needed will vary with the density and speed of traffic, with the decrease in man power caused by the labor shortage and in accordance with the amount of territory to be maintained. The advantages of machine tamping are well recognized, in that it is more uniform and stands up longer than hand tamping. The difficulty of maintenance and upkeep of the equipment in the hands of inexperienced men and the comparatively short time during the year that such equipment can be kept in use by a section gang, as well as its limited range of use, are the disadvantages.

It has been my belief that the more intensive machine tamping by large extra gangs, engaged entirely in the specialized work of tamping, is more effective as well as more efficient than the scattered use of small units by small gangs. On the other hand, in view of the decreasing supply of labor, I know of no better way to provide the additional energy needed than to substitute machine power for man power.

retainers, the stringers and the caps on both sides of the track. It is our practice to erect frame bents, instead of driving piles, for the renewal of pile bents in both ballast and open-deck trestles, provided the deck and 60 per cent of the piles are in sufficiently good condition to carry traffic safely for several years.

Frame Bent Is Best

BY SUPERVISOR OF BRIDGES AND BUILDINGS

It is not the simple matter to redrive a bent in a ballast-deck trestle than it is in an open-deck structure, for which reason, provided the deck and the piles in the remaining bents are good for the most part, it is better to erect a frame bent; in fact, it is quite frequently more economical to erect a frame bent in an open-deck trestle than it is to redrive it. In a ballast-deck structure, the question of economy should not be ignored, although it is usually completely overshadowed by the practical factors of supporting the track and of removing the ballast and the ballast floor to provide an opening for the entry of the piles and then of shifting the stringers to permit them to be driven with the correct spacing and batter.

From my own point of view it is greatly preferable to erect a frame bent, provided the condition of the trestle permits, than to drive a pile bent, even under normal conditions. The present volume of traffic and its importance from the national standpoint merely increase the desirability of doing so. Much will depend on the condition of the trestle, however. If the deck is not in good condition, that is, if it must be renewed in the near future, it may be better to redrive the bent. The desirability of doing this may be increased if a number of bents are in need of renewal.

Again, the condition of the piles in the remaining bents will be a factor that must be considered. A frame bent does not add longitudinal stiffness to a trestle unless it is well secured with longitudinal or tower bracing, or both. Such bracing may be needed with high-pile bents, but is even more necessary with frame bents. If the piles in more than half of the bents will last for several years, a frame bent should be erected; if half or more of the piles are not satisfactory, the whole trestle should be redriven. This latter is a general statement, however, and the judgment of an experienced bridge man on the ground, after a thorough inspection of the trestle, will be worth more than any generalization.

Pile or Frame Bent?

Considering the present volume and possible delays to traffic, where an entire bent of a ballast-deck trestle requires renewal, is it preferable to redrive it or to erect a frame bent? Why? What considerations are involved?

Must Be Solid

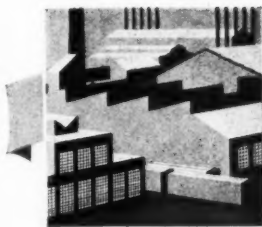
By L. G. BYRD

Supervisor of Bridges and Buildings,
Missouri Pacific, Poplar Bluff, Mo.

If the deck of the bridge is in good condition, requiring only light repairs or none at all for several years and the majority of the pile bents are also in good condition, it will be economical, and good judgment from a practical standpoint, to erect a frame bent. It will be equally good practice to renew all other bents that need replacement by erecting frame bents if not less than 50 to 60 per cent of the piles in the structure are good, provided the deck is in good condition. However, it is always necessary to know that the frame bent is resting on a solid foundation.

Excavation should be carried to a sufficient depth to insure that the pile stubs are sound and the surfaces exposed in cutting off the piles should be treated with hot creosote.

In advance of the renewal of the bent, a close inspection should be made to determine accurately the height of the frame bent, and all material should be preframed and prebored for treatment. If the bent is more than 10 ft. high, and it is necessary to renew several bents in succession, it may be necessary to install tower bracing. Posts and sills should be anchored to the pile stubs by means of straps or angle irons, to prevent any movement of the bent during periods of floods. Frame bents should also be attached securely to the deck by means of bolts which pass through the ballast



PRODUCTS of Manufacturers

Fairmont Derrick Car

A DERRICK Car W60, series A, has been developed by Fairmont Railway Motors, Inc., Fairmont, Minn., which is capable of handling loads up to 3000 lb. and which is adapted to handling heavy materials in railway bridge and building and track work. The car consists of a hand-operated derrick mounted upon a specially constructed push car. The derrick consists of a cylindrical steel mast and a boom mounted in the center of the car. The mast is braced in four directions by structural steel angles. The boom is 7 ft. long and is operated by 5/16-in. improved plow steel cables. Hand-operated winches with a ratchet and pawl lock provide two speeds of operation for both the hoisting and boom cables. A hand brake is provided for lowering and a clamp lock for the boom elevation.

The car has a frame of structural steel channels, angles and gusset plates; steel faced deck sills; four adjustable insulated rail clamps; a deck tray for the crank handles; extension lift handles; one differential axle; and four-wheel adjustable foot-operated brakes with metal liners and a ratchet lock. The axles are 1 3/8 in. in diameter, made of SAE 1045 steel, mounted in Timken double row bearings. The wheels are demountable, 16 in. by 5/16 in., and all four wheels are insulated. The overall width of the car is 5 ft. 7 1/4 in., the length 9 ft.

3 1/2 in., and the height 7 ft. 1/4 in. above the rail. The car weighs 1,700 lb., and the lifting weight, using the extension handles, is 500 lb. It is said that box construction of the mast anchor base allows full loads to be handled without distorting the frame.

The boom reaches 7 ft. from the center of the track, and by raising the boom, heavy timbers can be loaded on the sides of the car, transported and then unloaded or swung into position. A 6-ft. safety coupler link is provided for towing the derrick, when loaded, with a motor car. Full 360-deg. operation of the derrick permits working between the rails on bridges as well as at the sides.

Skip-Pipe Underdrains

THE Robinson Clay Product Company, Akron, Ohio, and the W. S. Dickey Clay Manufacturing Company, Kansas City, Mo., have placed a vitrified clay cradle invert pipe, known as Skip-Pipe, on the market, which has a number of characteristics that adapt it particularly for subdrainage installations.

Skip-Pipe is a bell and spigot type of clay tile pipe with a special semi-circular or U-shaped section enclosed by a top or cradle between the legs of the U. This cradle is slightly concave, has the same thickness as the barrel of the pipe and may have a

smooth surface or longitudinal corrugations. At the bell end of the tile small L-shaped lugs on the inside diameter of the bell make the pipe self-centering and maintain a positive opening of approximately 3/8 in. between the outside surface of the spigot end and the inside surface of the bell for the entrance of fluid at the joints. In addition, the cradle may be chamfered at the spigot end, increasing this opening slightly for the full width of the cradle and directing water in the direction of flow as it passes from the cradle into the pipe.

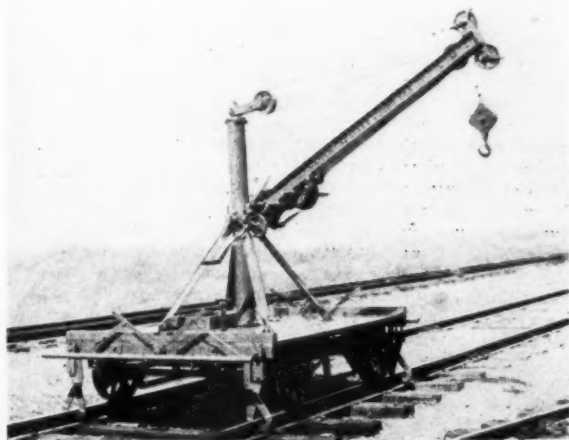
While the inside cross sectional area of Skip-Pipe is only about 75 per cent as large as that of full round pipe of the same diameter, it is said that its hydraulic properties are such that it will discharge a greater volume of water when flowing at capacity than round pipe of comparable size. Another property of Skip-Pipe is its



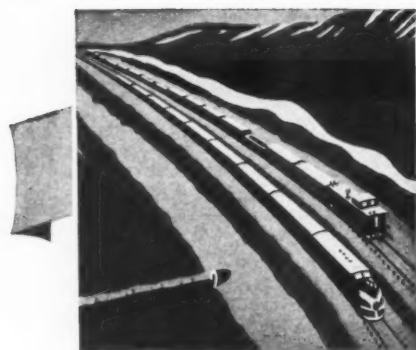
An Installation of Robinson Skip-Pipe on the Big Four Near Sidney, Ohio

low head take-off. Under comparative tests it has been shown to start discharging water before other pipes and to continue discharging long after other types have ceased. Other advantages claimed for this pipe are that choking or clogging is virtually impossible even under abnormal conditions, since the cradle action creates a miniature waterfall at every joint, a desirable anti-settling basin feature; that the pipe will not rust, corrode or disintegrate; that it is economical to lay or to replace in sections; that it will fit standard vitrified clay sewer pipe or fittings and that it has great structural strength.

Skip-Pipe are installed for subdrainage in the usual manner in a trench 8-in. wider than the diameter of the pipe. A 2-in. bed of broken stone is provided for the pipe to rest on and a covering of broken stone or other approved material is placed above. They are made in 2-ft. lengths of 4, 6, 8, 10 or 12 in. in diameter.



The New Fairmont W60, Series A, Derrick Car Has a Load Capacity of 3000 Lb. Seven Ft. from the Center of the Track



NEWS

of the Month

AA-1 Priority Authorized For Repairs and Maintenance

The War Production Board's Requirements Committee on November 11 authorized that the top priority rating of AA-1 may be applied to essential repair and maintenance. Included in the scope of the determination, "a basic policy for the first quarter of 1943," are "transportation systems," which are listed among industries to be "assured of materials to keep them performing their essential functions."

Maintenance of Way and Structures Expenditures

Expenditures for railway maintenance of way and structures in September, 1942, were \$75,637,517, the highest for any September since 1929, and an increase of \$19,613,879, or 35 per cent, over September, 1941. During the first nine months of 1942, maintenance of way and structures expenditures totaled \$576,360,117, the highest for any like period since 1929, and a gain of \$145,731,745, or 33.8 per cent, over the corresponding period in 1941.

Eastman Opens "Don't Travel" Drive

In an appeal to people to stay at home unless there is real need to travel, Director Eastman of the Office of Defense Transportation on November 19 began what is described in an ODT announcement as a "nation-wide drive to keep the American public at home." The statement suggests that a program that "informs and appeals for public understanding and help" should precede any attempt at government travel rationing or limitation, and supports the theme of the advertising program lately undertaken by the Association of American Railroads as well as that of a number of individual roads.

"The time is here," Mr. Eastman said, "when all the American people must understand, what many of them now realize, that unnecessary travel can do real and serious harm to the war effort."

"Overcrowding on many rail and bus lines already has become very serious," he added. "With intercity travel by private automobile practically out of the picture and troop movements constantly increasing, conditions will become much worse, unless the American public comes to the rescue."

"There is a great shortage in travel facilities, and those that we have are vitally needed for our military forces and war business. Mere pleasure travel cuts into and robs the supply for those necessary purposes, and will do this more and more

as time goes on. The American people can cure this situation if they will. The way to do it is to stay home, unless there is real need to travel. Particularly, keep off the crowded routes. It isn't difficult to find out which these are."

WPB Allotments for 1943

On November 19, the War Production Board announced the allocation of new freight cars, locomotives, rail and maintenance materials for various periods in the first part of 1943, as follows: First quarter allotments of steel for maintenance of way and equipment; rail, 480,000 tons; track accessories, 288,000 tons; repairs to equipment, 330,000 tons. On an annual basis, these would indicate 1943 totals as follows: rail, 1,920,000 tons; track accessories, 1,152,000 tons; repairs to equipment, 1,320,000 tons. This compares with 2,100,000 tons of rails and "adequate maintenance materials" requested by the railroads for their program in 1943. Eight-months authorizations were made for 250 steam locomotives and 36 road Diesels, and six-months authorizations for 100 Diesel switchers and 20,000 freight cars. This would indicate a 1943 program calling for 629 locomotives and 40,000 freight cars. This compares with a program in 1943 of 900 new locomotives and 80,000 new freight cars which the railroads have called for to maintain their minimum requirements. WPB's announcement of the authorizations said that its action would enable railroads "to place promptly the major portion of their orders to assure delivery on schedule."

Eastman Asks for Quick Action on Track Labor Shortage

Prompt action to obtain sufficient track laborers "for the safe maintenance of track and roadway" on "certain Western railroads" was urged upon the War Manpower Commission by Director Eastman of the Office of Defense Transportation on November 20. Mr. Eastman called for a WMC determination as to whether such labor could be obtained from domestic sources; and if the answer is in the negative, he requested that "immediate steps" be taken "to arrange for the importation of labor from Mexico in sufficient numbers to meet the most pressing minimum needs . . . until domestic labor again becomes available."

In his announcement, Director Eastman called the attention of WMC Chairman Paul V. McNutt to "the increase in derailments in the Western District in 1942 as compared with 1941." A "considerable part" of the increase, the ODT press release

added, "is blamed on inadequate maintenance of way."

The announcement also disclosed that representatives of the railroads and the maintenance-of-way employees "failed to agree on arrangements for the recruitment of Mexican labor" at recent Chicago conferences with government representatives. At that meeting, Mr. Eastman told Mr. McNutt that "an effort was made to include in a proposed plan a recognition of the wage problem, together with a recommendation that the existing wage negotiations be expedited and the propriety of granting time and one-half overtime after eight hours of employment" also be determined. Management representatives "were unwilling to include such proposals."

Manpower Shortage on Western Railroads

Manpower shortages on Western railroads in November brought from the Selective Service Headquarters telegrams to its directors in Western states, requesting that they take the situation into consideration and exercise caution in drafting railroaders. The request went out after discussions with the Office of Defense Transportation, in which connection Otto S. Beyer, director of the Division of Transport Personnel, said that ODT is "very apprehensive" about the manpower situation. Making a radio address on the evening of November 11, Mr. Beyer asserted that "transportation workers are directly engaged in war industry"; and that the problem of "keeping sufficient men and women on the job in the face of growing manpower shortages" means, among other things, "allocating men under the selective service act as between the transportation industry and the armed forces."

Amends Price Ceiling on Ties

The Office of Price Administration has amended its maximum price regulation covering railroad ties, thereby affording what the announcement called "a simple and effective manner of setting maximum prices" for ties in cases where a road did not receive similar ties during the first quarter of 1942, the base period.

The amendment (Amendment No. 3 to Maximum Price Regulation 216) authorizes OPA's Lumber Branch to fix the ceiling, and to announce it by telegram where speed is "desirable in the interest of national security." The amendment became effective November 12; and requests for maximums "must be accompanied by data sufficient to allow OPA to act."

Association News

Bridge and Building Association

President G. S. Crites has called a meeting of the Executive committee at Chicago on December 12 to review the activities of the association and to complete the organization of committees for the new year.

Roadmasters' Association

E. L. Banion, president of the association, has called a meeting of the Executive committee in Chicago on Saturday, December 5 to organize the work of the Association for the new year. Miss Lorene Kindred has been selected by the Executive committee as secretary, with offices in Room 822, the Straus Building, Chicago, taking over the duties relinquished by A. G. Shaver. Miss Kindred is also secretary of the American Railway Bridge and Building Association.

Maintenance of Way Club of Chicago

One hundred twenty-six members and guests attended the meeting of the club in the Ambassador Room of Huyler's Restaurant in the Straus Building, Chicago, on November 23, when G. P. Palmer, engineer maintenance and construction, Baltimore and Ohio, Chicago Terminal, spoke on Keeping Our Terminals Open For War-Time Traffic This Winter. In his address, which is presented elsewhere in this issue, Mr. Palmer stressed the importance of making maximum use of snow fighting equipment to meet any severe conditions which may arise, and of taking every possible step to insure that labor forces will be available.

The next meeting of the club, which will be held on December 21, will be addressed by E. C. Vandenberg, engineer maintenance of way, Chicago & North Western, who will speak on Selecting the Essentials in Maintenance for 1943.

Metropolitan Maintenance of Way Club

At the next meeting of the club, which will be held at the Hotel Governor Clinton, New York City, at 12:30 p.m. on December 10, the principal speaker will be J. B. Jones, division superintendent of the Pennsylvania at Jersey City, N.J., whose address will be entitled "Toward Operating Efficiency Through Departmental Teamwork." In scheduling this meeting for December 10, the club is following its usual practice of holding its December meeting on the same day as the annual dinner of the New York Railroad Club.

The last meeting of the club was held at the Hotel Governor Clinton on October 22. This meeting was devoted to a discussion of the problem that has developed as the result of the shortage of new rail and the high rate of wear on existing rail caused by the record amount of traffic now moving. Two speakers addressed the meeting, namely, C. B. Bron-

son, inspecting engineer of the New York Central, who spoke on The Rail Program under Wartime Conditions, and Blair Blowers, division engineer of the Erie, who discussed Rail Maintenance To Get Maximum Life. Sixty-six members and guests were in attendance at the meeting.

American Railway Engineering Association

With the year's work of committees either completed or drawing to a close, only one committee has scheduled a meeting in December, this being the Committee on Rail, which will meet in Chicago on December 8. In addition, however, the Board of Direction and the Nominating committee of the association will meet in Chicago on December 9. Late in December, Bulletin No. 435 will be mailed to members, this bulletin to include reports of the committees on Buildings, Highways, Yards and Terminals, Economics of Railway Labor, Cooperative Relations With Universities, and Maintenance of Way Work Equipment.

Five committees held meetings in November, as follows: Cooperative Relations With Universities, at Cleveland, Ohio, on November 9; Track, at Chicago, on November 12; Records and Accounts, at Chicago, on November 12; Masonry, at Chicago, on November 12 and 13; and Economics of Railway Labor, at Chicago, on November 13. Late in November, Bulletin No. 434 was mailed to members, this bulletin including reports of the committees on Electricity; Signals and Interlocking; Waterways and Harbors; Economics of Railway Location and Operation; and Water Service, Fire Protection and Sanitation.

Wood-Preservers' Association

The Nominating committee has recommended the following members of the American Wood-Preservers' Association for election as officers for the association year beginning at the conclusion of the next annual meeting, which will be held at the Netherland Plaza Hotel, Cincinnati, on April 27-29, 1943: For president, R. H. Colley, engineer, Bell Telephone Laboratories, Inc.; for first vice-president, W. P. Arnold, technical director, Wood Preserving Division, Koppers Company; for second vice-president S. D. Hicks, vice-president, Southern Wood Preserving Company; for treasurer, H. L. Dawson, re-elected; for Executive committee, J. S. Giddings, inspector, Treating Dept., Atchison, Topeka & Santa Fe, Topeka, Kan.; and G. B. McGough, superintendent, Bond Bros., Louisville, Ky.

At a meeting in Chicago in October, the Executive committee reviewed the plans for the next annual meeting in the light of war conditions and determined that "it is as much a duty to make our services available to the government collectively as an Association, as it is to do so individually." Emergency instructions have, therefore, been given all committees to "report on current and possible future applications of committee work to war emergency problems." The Executive committee is scheduling another meeting in Chicago in January.

Personal Mention

General

W. H. Kyle, division engineer on the Canadian National at Montreal, Que., has been promoted to acting superintendent of the Montreal terminals, with the same headquarters.

Howard W. McCauley, superintendent of the ore operations of the Northern Pacific at Superior, Wis., and a maintenance officer by training and experience, has been promoted to superintendent of the Yellowstone division, with headquarters at Glendive, Mont. J. T. Stotler, trainmaster at Dickinson, N.D., and an engineer by training and experience, has been advanced to superintendent of the ore operations at Superior, succeeding Mr. McCauley.

William W. Judson, general manager of the Lines East of Livingston (Mont.) of the Northern Pacific, with headquarters at St. Paul, Minn., and an engineer by training and experience, has been ap-



William W. Judson

pointed chief of the new Public Services branch of the Program division of WPB. The broad function of this branch of WPB will be to advise the vice chairman on programs involving transportation, communication and other public services.

Mr. Judson was born in Rochelle, Ill., on March 24, 1891, and attended Knox College, Galesburg, Ill., and Dartmouth College, Hanover, N.H. He entered railway service in 1911 in the engineering department of the Spokane, Portland & Seattle, and in 1914, he went with the Northern Pacific as a rodman, later serving as instrumentman and assistant engineer in the engineering department at Centralia, Wash. In 1917, he joined the United States Army, becoming a first lieutenant in the transportation corps, and serving in France for 15 months. In 1919, he returned to the Northern Pacific, serving as an assistant engineer on maintenance and construction work until 1927, when he was assigned to the position of special assistant to the operating vice-president at St. Paul. Two years later he was promoted to trainmaster on the

Pasco division at Pasco, Wash., later being transferred successively to Spokane, Wash., and Seattle. In 1933, he was advanced to assistant to the general manager, with headquarters at Seattle, and on June 1, 1936, he was promoted to superintendent of the Yellowstone division, with headquarters at Glendive, Mont., later being transferred to Missoula. On February 1, 1940, he was advanced to general manager at St. Paul.

W. M. Armstrong, assistant chief of research and development of the Canadian National and an engineer by training and experience, has been promoted to assistant vice-president in charge of telegraphs and



W. M. Armstrong

telephones, with headquarters as before at Toronto, Ont. Mr. Armstrong is a native of Ottawa and served overseas during World War I. He entered railway service in 1920 as an assistant engineer on the Canadian National and in 1923 was appointed to the Bureau of Economics of the C. N. R. From 1924 to 1929 he served as assistant to the assistant vice-president on the Canadian National, with headquarters at Montreal, Que. Mr. Armstrong was made assistant chief of research and development in 1939.

Engineering

Charles T. Warren, engineer of track of the Wabash, with headquarters at St. Louis, Mo., has been commissioned a major in the Military Railroad Service.

R. D. Tobien, assistant general manager of the Western lines of the Southern at Birmingham, Ala., has been promoted to assistant to the chief engineer, with headquarters at Washington, D. C.

O. J. Stransky, engineering assistant on the Denver & Rio Grande Western at Denver, Colo., has been promoted to cost engineer, with the same headquarters, succeeding **J. R. Kubler**, who resigned to accept a position with the U.S. Army Engineers at Denver.

W. E. Ross, assistant engineer on the Chicago, Milwaukee, St. Paul & Pacific at Terre Haute, Ind., has been promoted to division engineer at Ottumwa, Iowa, succeeding **R. A. Whiteford**, who has been transferred to Marion, Iowa. Mr. Whiteford relieves **H. Wuerth**, who has been transferred to Savanna, Ill., replacing

H. B. Christianson, who has been commissioned a lieutenant colonel in the U.S. Army.

W. W. Rohrbough, office engineer on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four-part of the New York Central system) at Cincinnati, Ohio, has been appointed assistant division engineer at Bellefontaine, Ohio, succeeding **Walter C. Schakel**, whose promotion to assistant engineer of structures, with headquarters at Cincinnati, was reported in the October issue. **B. E. DeLamater**, first assistant engineer at Springfield, Ohio, has been appointed office engineer at Cincinnati, replacing Mr. Rohrbough.

J. H. Lindsay, assistant division engineer on the Baltimore & Ohio at Cumberland, Md., has been promoted to division engineer of the Wheeling division, with headquarters at Wheeling, W. Va., succeeding **Guy Long**, who has been transferred to the Monongah division, with headquarters at Grafton, W. Va. Mr. Long relieves **E. J. Clopton**, who has been transferred to the Akron-Chicago division, with headquarters at Akron, Ohio, replacing **J. W. Purdy**, whose promotion to assistant superintendent of the same division was reported in the November issue.

William T. Donoho, assistant engineer on the Gulf, Colorado & Santa Fe at Galveston, Tex., has been promoted to the newly created position of district engineer, with the same headquarters. Mr. Donoho was born at Utopia, Tex., on March 20, 1891. He graduated in civil engineering from Texas A. & M. college in 1913 and took post-graduate work in



William T. Donoho

1915-16. Prior to entering railway service, he was employed by the Panama Canal Commission, the Interstate Commerce Commission, served one year as an instructor at Texas A. & M. college and served as a lieutenant in World War I. Mr. Donoho entered railway service in July, 1920, as an instrumentman on the Southern division of the G. C. & S. F. at Temple, Tex. He was transferred to Galveston in 1921 and promoted to assistant engineer in 1924, since which time his service has been general, involving both field and office work.

Homer L. Woldridge, whose promotion to division engineer of the Northern

division of the St. Louis-San Francisco, with headquarters at Ft. Scott, Kan., was reported in the November issue, was born at Breckenridge, Mo., on April 13, 1903, and attended the University of Missouri. He entered railway service in June, 1927, as a rodman on the Frisco at Springfield, Mo., and in September, 1928, he was promoted to transitman. In February, 1931, he was appointed frog repair helper on the Eastern division, with the same headquarters, and in July, 1933, he was advanced to frog repairer. In April, 1935, he was appointed instrumentman in the office of the assistant chief engineer at Springfield and in July, 1938, he was advanced to roadmaster of the Kansas City Terminal division, with headquarters at Kansas City, Mo. Mr. Woldridge was transferred to Amory, Miss., in November, 1941, where he remained until his recent promotion.

Harold E. Preece, whose promotion to assistant division engineer on the Atchison, Topeka & Santa Fe at Needles, Ariz., was reported in the October issue, was born at Jackson, Mich., on October 28, 1895, and entered railway service in April, 1912, with the Grand Rapids & Indiana (now part of the Pennsylvania) at Grand Rapids, Mich., later working successively for the Grand Trunk Western at Grand Rapids and the Detroit & Toledo Shore Line, the Wabash, the Michigan Central and the Canadian Pacific at Detroit, Mich. In 1915 he became assistant traffic manager of the Saxon Motor Company at Detroit and a year later returned to railway service as a chairman on the Coast lines of the Santa Fe, later being advanced successively to rodman, inspector and transitman. Mr. Preece was promoted to roadmaster at Gallup, N. M., in 1936 and was then transferred successively to Stockton, Cal., and Richmond, being located at the latter point until his recent promotion, effective October 1.

Leon E. Smith, whose promotion to assistant division engineer on the Atchison, Topeka & Santa Fe, with headquarters at San Bernardino, Cal., was reported in the October issue, was born at Hornell, N. Y., on September 17, 1887, and entered railway service in June, 1909, as a rodman on the Erie. In September, 1910, he went with the Santa Fe as a draftsman at Winslow, Ariz., later serving as a masonry inspector at various locations. In November, 1915, he was promoted to transitman, serving in that capacity on the Valley and Los Angeles divisions until June, 1917, when he was promoted to assistant engineer on construction work. From September, 1919, to October, 1927, Mr. Smith was assigned to maintenance work on various divisions and on the latter date he was appointed assistant engineer on construction work. In June, 1928, he was appointed transitman on the Los Angeles division and in July, 1937, he was advanced to roadmaster at Kingman, Ariz. Mr. Smith was transferred to Los Angeles, Cal., in November, 1938, where he remained until his recent promotion, effective October 1.

Kenneth L. Clark, whose promotion to division engineer of the Hastings and Dakota division of the Chicago, Mil-

(Continued on page 918)



"No more of this trouble now..
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PRESSURE TREATED WOOD
won't rot out!"

When the Baltimore and Ohio Railroad re-roofed its back shop at the Glenwood Yards, Pittsburgh, Pa., the Chief Engineer of Maintenance specified *pressure-treated wood*, to eliminate the continuous repairs and replacements that the old roof had demanded.

Railroads pioneered the utilization of pressure-treated timber, and have remained the largest users, so that the permanent character of properly preserved wood is a matter of personal knowledge to every old railroader. The carpenter superintendent on the job, when asked how long he expected the new roof to last, said, "Well,

as a matter of fact, I never knew any pressure-treated wood to rot out."

The roof is 639' x 239' between firewalls. Pressure-treated fir lumber, tongue and groove, 3" thick, 6", 8" and 10" wide, in 10' to 20' lengths, was used.

Pressure-treated lumber is the engineer's best answer to wartime, as it was to peacetime, construction needs. Essential buildings, bridges, and other structures of pressure-treated wood are being completed in less time than it would take to get delivery on some types of construction materials.

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waukee, St. Paul & Pacific, with headquarters at Aberdeen, S.D., was reported in the November issue, was born at Moberly, Mo., on March 15, 1907, and graduated in civil engineering from the University of Missouri in 1929. He first entered railway service during a summer vacation in 1923 as a laborer on the Wabash and served during succeeding summers as a welder helper, bridge and building carpenter, assistant extra gang foreman and rodman. After graduation in June, 1929, he returned to the Wabash as an instrumentman on the Moberly division, later serving as bridge inspector, track supervisor and assistant engineer. In September, 1934, he went with the U.S. Engineers, surveying for the Ft. Peck dam in Montana and served successively as chief of party, shift engineer on tunnel construction and field engineer in charge of all tunnel construction. In April, 1937, Mr. Clark returned to railroad service as an instrumentman on the Milwaukee at Aberdeen and in December, 1937, he was promoted to assistant engineer at Savanna, Ill. He was transferred to Chicago (Western avenue) in Novem-



Kenneth L. Clark

ber, 1938, and in April, 1941, he was transferred to the chief engineer's office at Chicago, where he remained until his recent promotion, effective November 1.

R. Laymon Mays, whose promotion to designing engineer of the New York, Chicago & St. Louis (Nickel Plate), with headquarters at Cleveland, Ohio, was reported in the November issue of *Railway Engineering and Maintenance*, was born at New Castle, Ky., on January 22, 1904, and graduated in civil engineering from the University of Kentucky in 1925. He entered railway service in March, 1926, as a structural draftsman on the Detroit, Toledo & Ironton at Dearborn, Mich., and later served also on location and other field work. Mr. Mays went with the Nickel Plate on April 2, 1928, as structural designer at Cleveland and in April, 1940, was appointed assistant engineer on the Ft. Wayne and Chicago divisions, with headquarters at Ft. Wayne, Ind. On June 1, 1941, he was promoted to assistant division engineer at Ft. Wayne and on June 16, 1942, he was appointed assistant supervisor of bridges and buildings for the Clover Leaf district, with headquarters at Frankfort, Ind.,

which position he held until his recent promotion, effective September 1.

Frank K. Calkins, whose promotion to division engineer on the Denver & Salt Lake, with headquarters at Denver, Colo.,



Frank K. Calkins

was reported in the September issue, was born at Grand Rapids, Mich., on December 8, 1903, and completed a correspondence course in engineering. He entered railway service on July 26, 1926, as a rodman on the Colorado & Southern and was later advanced to levelman and instrumentman. From 1932 to 1935 he held various positions with the Bureau of Public Roads, the National Park Service, the Denver Municipal Water Company and private engineering companies. In May, 1935, Mr. Calkins returned to railway service as a rodman on the Denver & Salt Lake and two months later he was promoted to instrumentman. In July, 1936, he was promoted to assistant engineer and in September, 1940, he was appointed acting supervisor of bridges and buildings. A year later he returned to the position of assistant engineer, which position he held until his recent promotion.

Track

J. L. Hopkins has been appointed assistant roadmaster on the Atchison, Topeka & Santa Fe at Oceanside, Cal. **F. E. Dauner** has been appointed assistant roadmaster at Harper, Kan.

L. J. Shea, general foreman on the Central Railroad of New Jersey, with headquarters at Jersey City, N.J., has been promoted to the newly-created position of assistant supervisor of track, with headquarters at Ashley, Pa.

J. M. Rentfrow, track inspector on the Pueblo division of the Denver & Rio Grande Western, has been promoted to roadmaster at Alamosa, Colo., succeeding **W. B. Jacobsen**, who has been given a leave of absence for military service.

C. C. Wehrle, assistant supervisor of track on the New York Central at Cleveland, Ohio, has been promoted to supervisor of track on the Cleveland, Cincinnati, Chicago & St. Louis (Big Four-part of the New York Central system) at Galion, Ohio.

G. S. Bradshaw has been appointed roadmaster on the Canadian Pacific at

Bassana, Alta., succeeding **R. B. Plowman**, who has been transferred to Knee Hill, Alta. Mr. Plowman relieves **J. F. Earl**, who has been granted a leave of absence because of illness.

R. H. Becker has been appointed roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Aberdeen, S.D., succeeding **F. V. McLarnon**, who has been transferred to Milwaukee, Wis., relieving **G. A. Larson**, who has been granted a leave of absence because of ill health.

John E. Rogan, Jr., assistant supervisor of track on the Illinois Central at New Orleans, La., has been promoted to acting supervisor of track on the Gulf & Ship Island (part of the Illinois Central system) at Mendenhall, Miss., succeeding **J. H. Blackburn**, who has been granted a leave of absence because of ill health.

Arlie G. Watkins, whose promotion to roadmaster on the Chicago, Burlington & Quincy at Milan, Mo., was reported in the November issue, was born in Schuyler county, Mo., on July 24, 1892, and entered railway service in April, 1908, as a section laborer on the Burlington. In 1913 he worked in a telegraph line gang and in 1914 he was promoted to section foreman, later being advanced to track supervisor. He was located on the St. Joseph division at the time of his recent promotion to roadmaster.

R. Rimstad, section foreman on the Kenora division of the Canadian Pacific, has been promoted to roadmaster at Ignace, Ont., succeeding **D. M. Dunlop**, whose promotion to assistant superintendent at Kenora, Ont., was reported in the November issue. **Stanley Harrison**, relieving roadmaster on the British Columbia district, has been advanced to roadmaster at Kaslo, B.C., relieving **James N. Murphy** who retired on November 1 because of ill health. **F. W. H. Minifie**, section foreman at Galloway, B.C., has been advanced to relieving roadmaster on the British Columbia district.

J. S. Foley, whose promotion to supervisor of track on the Illinois Central at Waterloo, Iowa, was reported in the November issue, was born at Correctionville, Iowa, on July 2, 1896, and entered railway service on March 1, 1914, as a section laborer at Anthon, Iowa. On August 14, 1917, he was promoted to section foreman at Anthon, where he remained until October, 1941, except for the years, 1930 and 1937, when he served as an extra gang foreman. Mr. Foley was transferred to Cherokee, Iowa, on October 1, 1941, being located at that point until his recent promotion.

Harry T. Smith, whose promotion to general foreman of bridges and buildings of the Wheeling & Lake Erie, with headquarters at Brewster, Ohio, was reported in the October issue, was born at Strasburg, Ohio, on December 20, 1890, and entered railway service on January 1, 1911, as a carpenter on a bridge gang of the W. & L. E. On April 11, 1919, he was promoted to pile driver engineer and on September 1, 1923, he was advanced to master carpenter at Brewster. On

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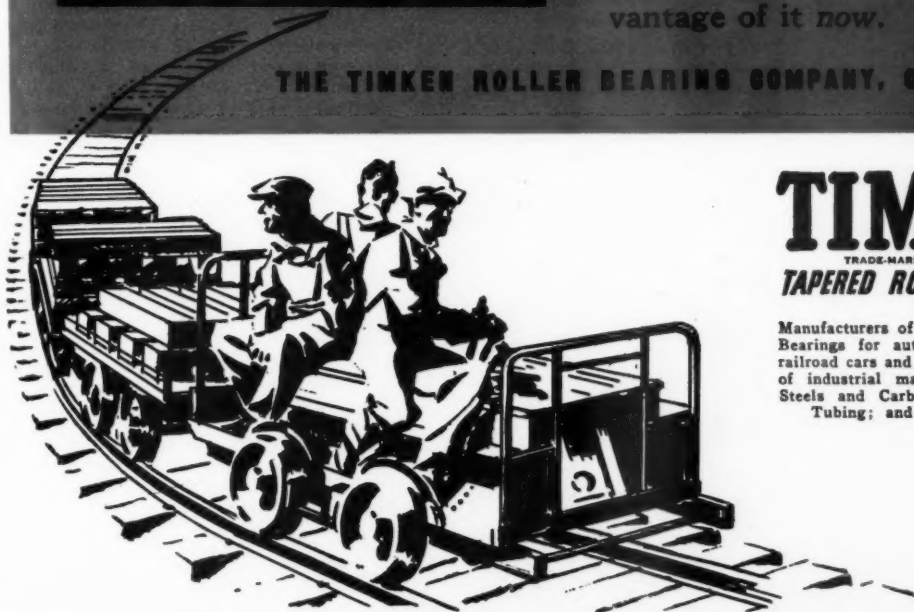
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March 1, 1928, Mr. Smith was appointed general inspector, with the same headquarters, which position he held until his recent promotion.

Max P. Arnold, whose promotion to supervisor of track on the Illinois Central at Sardis, Miss., was reported in the October issue, was born at Winona, Miss., on September 28, 1900, and entered railway service on March 1, 1918, as an extra gang laborer on the Illinois Central at West, Miss. Seven months later, he was promoted to assistant extra gang foreman on the Illinois division and on June 1, 1920, he was appointed fence gang foreman at Winona. Mr. Arnold was appointed section foreman at Strong, Miss., on October 2, 1922, which position he held until his recent promotion effective September 1.

R. C. Corley, assistant roadmaster on the Southern Pacific Lines in Texas and Louisiana, has been promoted to acting roadmaster, with headquarters at Austin, Tex. Mr. Corley was born at Abilene, Tex., on April 6, 1910. He first entered Southern Pacific service on August 9, 1929, and was employed intermittently from then until February 10, 1936, as timekeeper-clerk, assistant section foreman, roadway machine operator, etc. He was assigned as section foreman on the west end of the San Antonio division in February, 1936, and later was made assistant roadmaster in the same territory, from which position he was transferred to Austin.

Stuart Shumate, assistant main-line supervisor on the New York division of the Pennsylvania, with headquarters at New Brunswick, N.J., has been promoted to branch-line supervisor on the Panhandle division, with headquarters at Wheeling, W. Va., to succeed **A. K. Howe**, who has been transferred to the Buffalo division, with headquarters at Dunkirk, N.Y. **J. T. Evans**, branch-line assistant supervisor of track at York, Pa., has been transferred to the main line at New Brunswick to succeed Mr. Shumate. **J. H. Jones**, assistant on the engineering corps of the Philadelphia division, has been appointed assistant supervisor of track at York, to replace Mr. Evans.

James B. Warne, whose promotion to roadmaster on the Canadian Pacific, with headquarters at Manyberries, Alta., was reported in the November issue, was born at Medicine Hat, Alta., on June 12, 1903, and entered railway service on May 20, 1921, as sectionman on the Canadian Pacific, later serving as a relief foreman at Shepard, Alta. On March 1, 1927, he was promoted to section foreman at Kininvie, Alta., later being transferred successively to Shepard and Alderson, Alta. Mr. Warne served as acting roadmaster at Leader, Sask., from July 23, 1941, to August 26, 1941, and as relief roadmaster at Red Deer, Alta., from June 9, 1942, to August 10, 1942. His promotion to roadmaster was effective September 1.

Virgil H. Acrea, whose promotion to supervisor of track on the New York Central (Big Four) at Hillsboro, Ill., was reported in the November issue, was born at Perth, Ind., on September 12, 1911, and entered railway service on August 12,

1929, as a section laborer on the Big Four at Perth. In May, 1939, he was promoted to extra gang foreman and served in that capacity and as a temporary section foreman until June 22, 1941, when he was advanced to assistant supervisor of track at Middletown, Ohio. On December 12, 1941, he was appointed acting supervisor of track at Galion, Ohio, and a month later he was appointed assistant supervisor of track at Anderson, Ind., which position he held until his recent promotion.

Kennard K. Rogers, whose promotion to roadmaster on the Atchison, Topeka & Santa Fe, with headquarters at Richmond, Cal., was reported in the October issue, was born at Garnett, Kan., on December 12, 1908, and entered railway service on October 5, 1931, as a section laborer on the Santa Fe at Orange Cove, Cal. Two years later he was transferred to the Calwa (Cal.) yards and in April, 1934, he was promoted to section foreman at Lamont, Cal., later being transferred successively to Millux, Cal., Pond, Waukena, Visalia and Corcoran. On January 1, 1941, Mr. Rogers was advanced to track supervisor, with headquarters at Visalia, which position he held until his recent promotion.

Raymond J. McEwen, whose promotion to supervisor of track on the New York Central at Corning, Ohio, was reported in the October issue, was born at Irving, N.Y., on October 21, 1897, and entered railway service as a clerk on Subdivision No. 1 of the New York Central at Silver Creek, N.Y. On March 16, 1920, he was promoted to chief clerk and on June 18, 1924, he was advanced to extra gang foreman at Dunkirk, N.Y. From December 1, 1926, to March 1, 1927, he served as acting assistant supervisor of track on Subdivision No. 1 and on the latter date returned to Dunkirk as extra gang foreman. On July 22, 1929, Mr. McEwen was advanced to assistant supervisor of track of Subdivision No. 10 at Toledo, Ohio, where he remained until his recent promotion, effective September 1.

R. F. Exline, whose promotion to roadmaster on the Denver & Rio Grande Western, with headquarters at Walsenburg, Colo., was reported in the October issue, was born at Salina, Kan., on December 13, 1911, and attended Kansas Wesleyan University, Salina, Kan., and Kansas State College. He entered railway service on February 12, 1937, as a rodman on the Pueblo division of the D. & R. G. W., later working on a fence gang and then alternating as assistant foreman of a system rail laying gang, assistant foreman of a surfacing gang and track inspector on the Pueblo division. On

April 1, 1941, he was appointed office engineer at Pueblo, Colo., and on November 1, 1941, he was appointed assistant engineer at that point, holding the latter position until his recent promotion, effective September 16.

Frederick E. Mayne, whose promotion to supervisor of track on the Illinois Central at Grenada, Miss., was reported in the November issue, was born at Dubuque, Iowa, on October 4, 1913, and graduated from the University of Dubuque, Dubuque, Iowa, in 1934, and in civil engineering from Iowa State College, Ames, Iowa, in December, 1936. He entered railway service during the summer of 1936 as a section laborer on the Illinois Central at East Dubuque, Ill., and returned there as a section laborer in January, 1937, after graduation. In March, 1937, he went with the Chicago, Rock Island & Pacific, as a rodman at Rock Island, Ill. and two months later returned to the Illinois Central as a chainman at Vicksburg, Miss. In November, 1937, he went with the Rock Island as a chainman at Cedar Rapids, Iowa, and three months later, was promoted to rodman at Des Moines, Iowa. He returned again to the Illinois Central on July 1, 1938, as a chainman at Memphis, and in March, 1940, was promoted to rodman. Mr. Mayne was appointed assistant supervisor of track at Memphis on February 1, 1941, which position he held until his recent promotion, effective October 1.

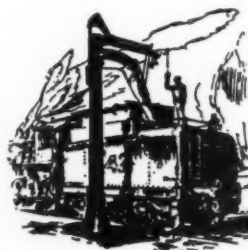
Harry W. Green, whose promotion to roadmaster on the Atchison, Topeka & Santa Fe at Chanute, Kan., was reported in the October issue, was born at Wynne, Ark., on January 11, 1907, attended Kansas State Agricultural College at Manhattan, Kan., for one semester in 1927 and studied a correspondence course in track work in 1939. He entered railway service on February 21, 1928, as a section laborer on the Santa Fe at Gordon, Kan., and on April 12, 1929, he was promoted to student foreman at Eldorado, Kan. During the summer months in 1929 and from 1932 to 1936 he worked as an assistant extra gang foreman. On June 22, 1936, he was advanced to section foreman at Clements, Kan., and on September 15, 1941, he was promoted to track supervisor at Augusta, Kan., which position he held until his recent promotion effective October 1.

Bridge and Building

George Davis, a bridge foreman on the New York Central, has been promoted to supervisor of bridges and buildings, with headquarters at Columbus, Ohio, succeeding **J. W. O'Neill**, who retired on October 31.

N. H. Langley, bridge and building master on the Canadian National, with headquarters at New Glasgow, N.S., has retired from active service. Mr. Langley was born on September 18, 1877, at Port Hawkesbury, N.S., and entered railway service in 1900. He had held the position of bridge and building master since August 2, 1918.

R. F. W. Schneider, engineering assistant on the Denver & Rio Grande Western at Denver, Colo., has been appointed to



(Continued on page 922)



TOPS

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PERFORMANCE
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Model F-2 BUDA Roadmaster
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THE BUDA "ROADMASTER"

2-4 man inspection car

Starts without pushing! Powerful 7.7 HP, 4-cycle air cooled engine starts easily. It's a free-running engine!

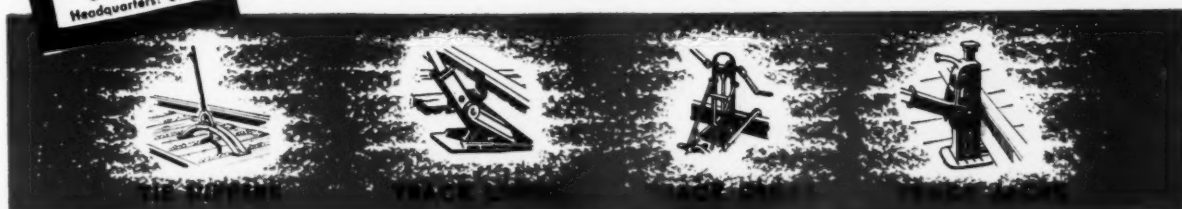
Reverses without killing the engine! The Roadmaster's trouble-free, rugged cone drive transmission is provided with forward, neutral and reverse positions so that direction of car may be quickly reversed without killing the engine. (A safety feature.)

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Write for detailed information about the complete BUDA line of railway equipment and supplies.

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the newly created position of building superintendent, with the same headquarters. Mr. Schneider is in charge of the Rio Grande office building at 1531 Stout street, which was recently purchased and remodelled for general offices.

Lora Sullivan, general foreman of bridges and buildings on the Illinois Central, with headquarters at Carbondale, Ill., has been appointed acting supervisor of bridges and buildings of the St. Louis division, with headquarters at E. St. Louis, Ill., succeeding **C. W. Lentz**, who has been granted a leave of absence, and **L. H. White**, building inspector in the office of the engineer of buildings at Chicago, has been appointed acting general foreman of bridges and buildings at Carbondale, relieving Mr. Sullivan.

Water Service

H. E. Graham, waterworks repairman on the Chicago terminal of the Illinois Central, has been promoted to assistant supervisor of water service of the Chicago terminal, with headquarters as before at Chicago, succeeding **J. Raymond Graham**, whose promotion to supervisor of maintenance of way work equipment, Northern lines, is reported elsewhere in these columns. **L. F. Abrams**, waterworks repairman at Waterloo, Iowa, has been advanced to waterworks foreman of the Iowa division, Lines west of Waterloo, with the same headquarters.

Special

Leo L. White, supervisor in charge of the motor car shop of the Illinois Central at Memphis, Tenn., has been promoted to supervisor of maintenance of way equipment, Southern lines, with the same headquarters. **J. Raymond Graham**, assistant supervisor of water service and equipment on the Chicago terminal, has been advanced to supervisor of maintenance of way work equipment, Northern lines, with headquarters as before at Chicago. Mr. Graham was born in Chicago on October 17, 1905, and entered railway service on October 10, 1924, as a water service helper on the Illinois Central at Chicago. On January 1, 1926, he was promoted to water service repairman and on July 1, 1942, he was promoted to assistant supervisor of water service and equipment at Chicago, which position he held until his recent appointment, effective October 1.

Obituary

J. R. Hickox, who retired in September, 1935, as hydraulic engineer of the Chicago, Burlington & Quincy, with headquarters at Chicago, died on November 2.

Win Against Winter.—An 8-page booklet of this title has been published by the La Plante-Choate Manufacturing Company, Inc., Cedar Rapids, Iowa, which describes in detail the various models of snow plows built by this company for use with Caterpillar Diesel tractors. The booklet is attractively printed in two colors and is illustrated with numerous photographs of the various types of La Plante-Choate snow plows at work.

Supply Trade News

Personal

Harry W. Renick has been appointed a vice-president of the Brake Shoe and Castings division of the **American Brake Shoe & Foundry Co.**, which position he will hold in addition to his present duties as vice-president of Brake Shoe's Ramapo Ajax division. Mr. Renick was born in



Harry W. Renick

Denver, Colo., and majored in civil engineering at Stanford University. After college he was employed with the Union Pacific and the Colorado & Southern in engineering and construction work. In 1913 he joined the Elliot Frog & Switch Co, now a part of Ramapo Ajax, and three years later was sent to St. Louis, Mo., as sales manager. In 1926, Mr. Renick was instrumental in opening Ramapo's first plant on the west coast at Los Angeles, Cal., for the manufacture of railroad frogs, switches, and special trackwork. He was placed in charge of this plant and, also, some time later, of a new plant at Seattle, Wash. When Ramapo Ajax became a Brake Shoe division, he was made vice-president in charge of the division's western plants at Los Angeles, Seattle and Pueblo, Colo.

J. B. Martin, who retired on September 30 as general inspector of track of the New York Central, Lines west of Buffalo, with headquarters at Cleveland, Ohio, has been appointed general inspector for the **Woodings-Verona Tool Works** and the **Woodings Forge & Tool Co.**, Verona, Pa., with headquarters at Chicago. A photograph and biography of Mr. Martin were published on page 748 of the October issue, following his retirement from railroad service.

George M. Cooper, sales representative at New York for the Ramapo Ajax division of the **American Brake Shoe & Foundry Co.**, has been transferred to the western sales department, with headquarters at Houston, Tex., representing the Brake Shoe and Castings division and the Southern Wheel division of this company. **J. P. Kleinkort** has been appointed

sales representative at New York to succeed Mr. Cooper.

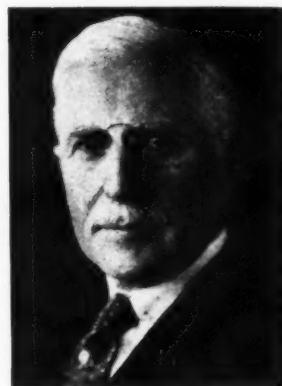
Mr. Cooper began his career with the **American Brake Shoe & Foundry Co.** in 1918 as an office boy in the Ramapo Iron Works, now a part of the Ramapo Ajax division. From January, 1921, to December, 1922, he was secretary to the president of the Ramapo company. In December, 1922, he was transferred to the export department, where he served until April, 1925. He then became sales representative at New York, where he remained until his recent transfer.

Obituary

James B. Strong, formerly president of the Ramapo Ajax Corporation (now the Ramapo Ajax division of the **American Brake Shoe & Foundry Co.**), died at Seatauket, Long Island, N. Y., on November 10. He was 66 years of age.

Carl A. Johnson, chief engineer of the Pettibone-Mulliken Corporation, Chicago, died on November 14, at his home in Oak Park, Ill., from a heart attack. Mr. Johnson was born in Chicago Heights, Ill., on November 29, 1895, and entered the employ of the Pettibone-Mulliken Corporation in 1918 as a draftsman.

George M. Verity, chairman and founder of the American Rolling Mill Company, Middletown, Ohio, died in that city on November 6. Mr. Verity was born in East Liberty, Ohio, on April 22, 1865. In 1886 he became manager of the W. C. Standish Wholesale Grocery Company in Cincinnati, Ohio, and in 1889 entered the steel industry when he took over the management of the Sagendorf Iron Roofing and Corrugating Company in Cincinnati. In 1891 this company was reorganized as the American Steel Roofing Company and Mr. Verity was elected vice-president and



George M. Verity

general manager. While in this capacity Mr. Verity decided to organize a company to manufacture iron and steel sheets, and in 1899 the American Rolling Mill Company, Middletown, Ohio, was incorporated. At the first meeting of the board of directors on January 5, 1900, he was elected president and general manager. He continued as president until January 8, 1930, when he was elected chairman of the board, the position he was holding at the time of his death.

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WITH
POZZOLITH
(CEMENT DISPERSION)



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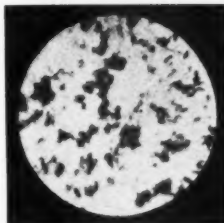
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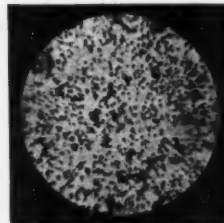
HOW CEMENT DISPERSION WORKS



Cement suspended in water
UNDISPERSED

WITHOUT POZZOLITH

In a normal concrete mix, cement particles tend to bunch together, thereby (1) limiting hydration and (2) trapping water within the cement clumps. (See photomicrograph above).



Cement suspended in water
DISPERSED

WITH POZZOLITH

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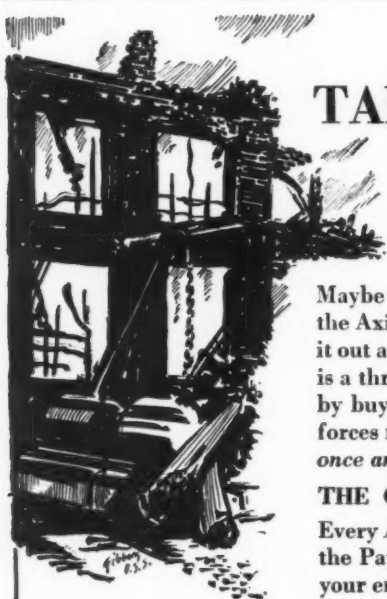
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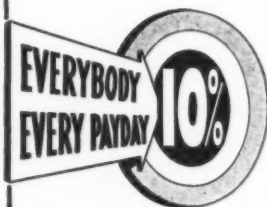


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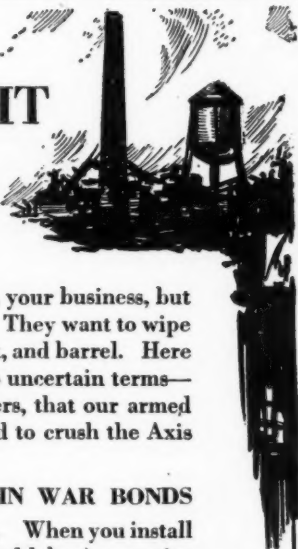
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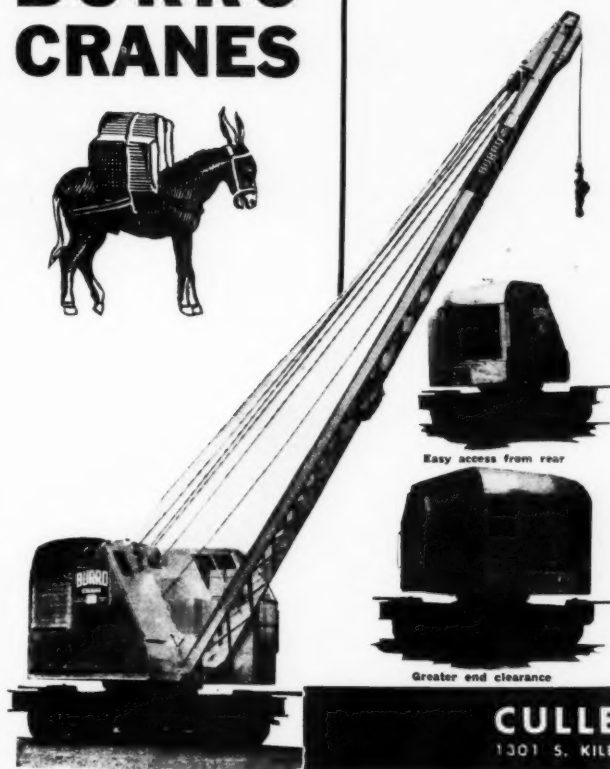
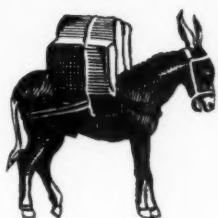


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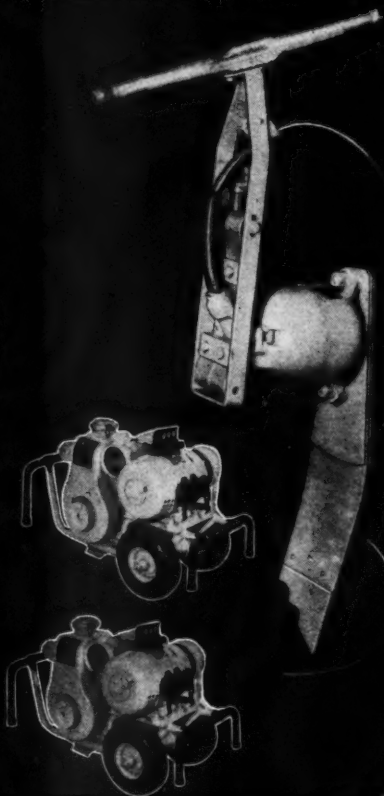
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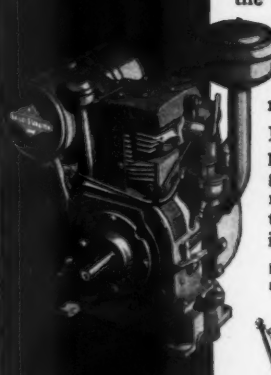
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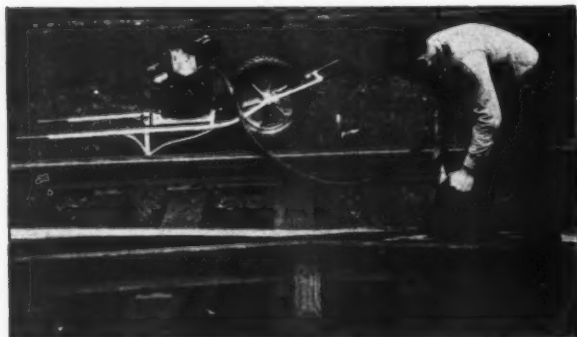
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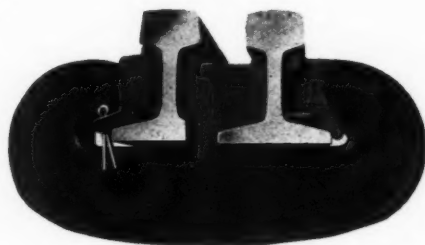
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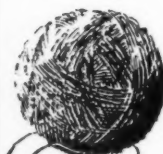
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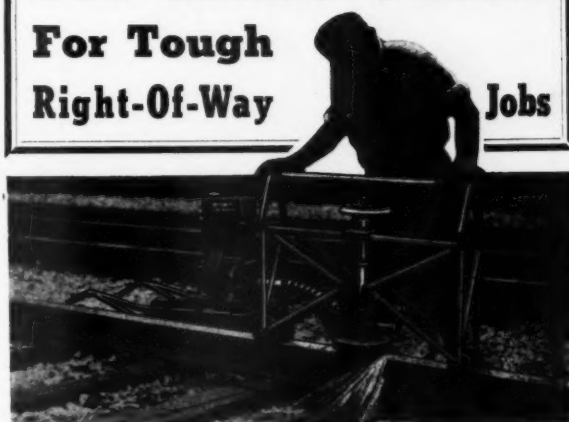
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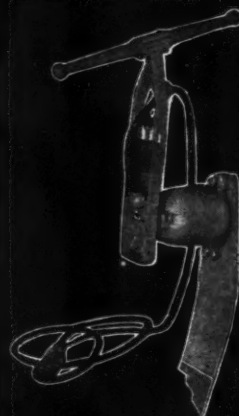
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Christmas

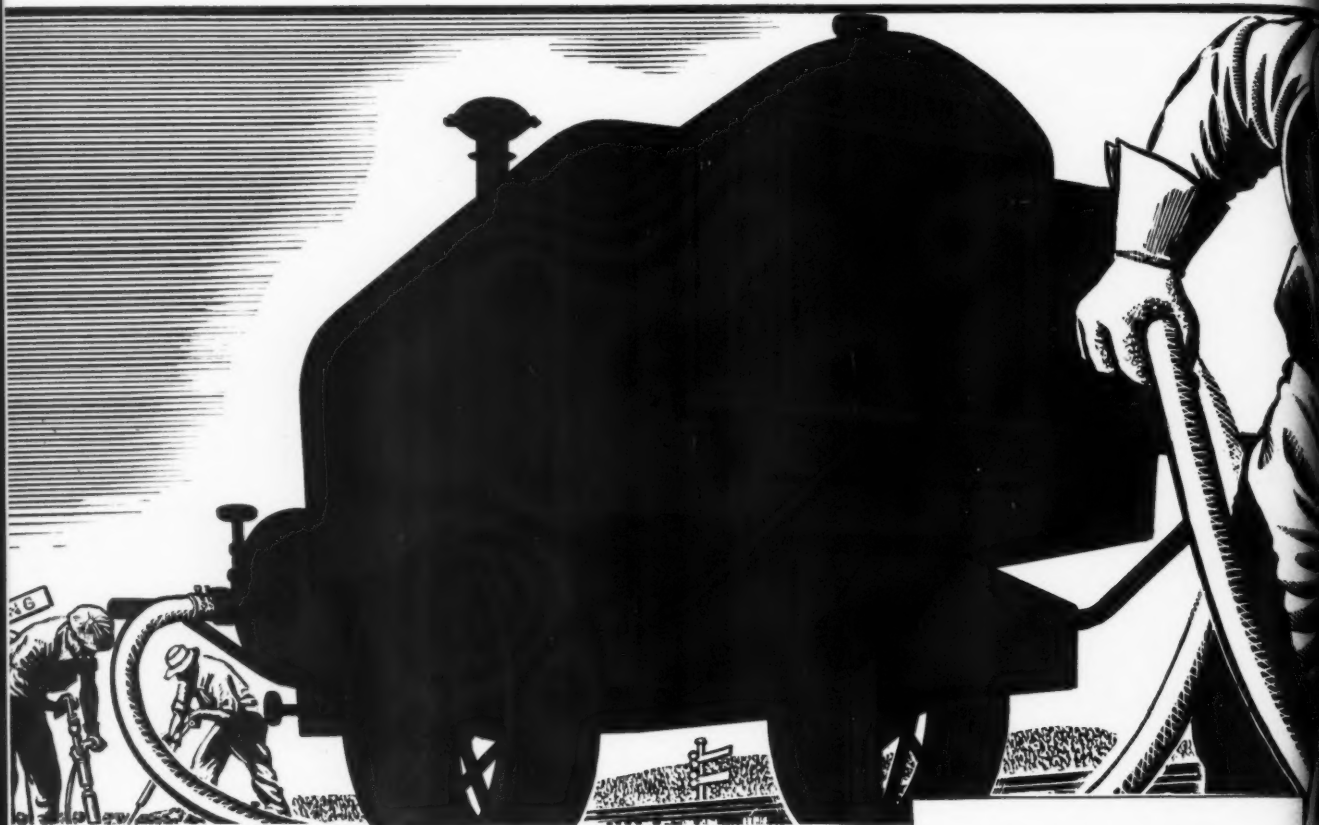
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